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(Formerly Archives of Physical Medicine)

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American Congress of Physical Medicine and Rehabilitation

32nd Annual

Scientific and Clinical Session

and

Instruction Seminar

SEPTEMBER 6-11, 1954

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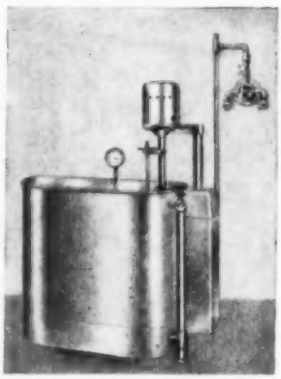

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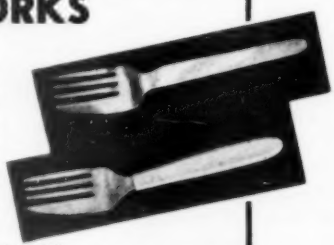

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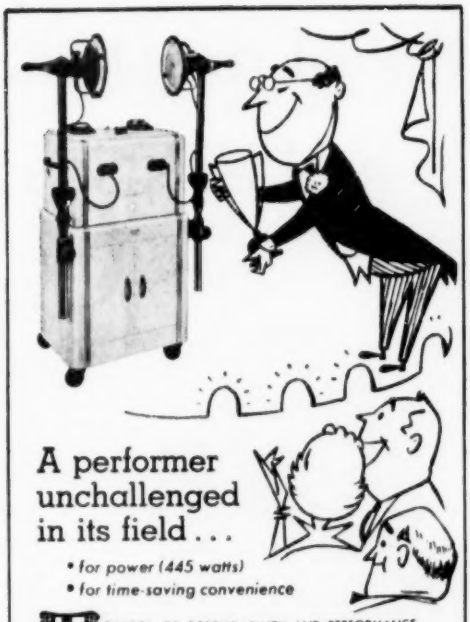

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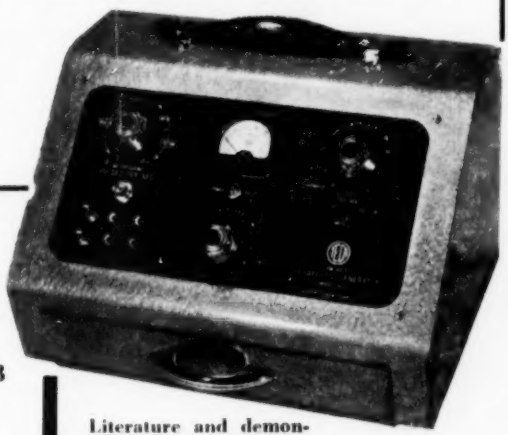

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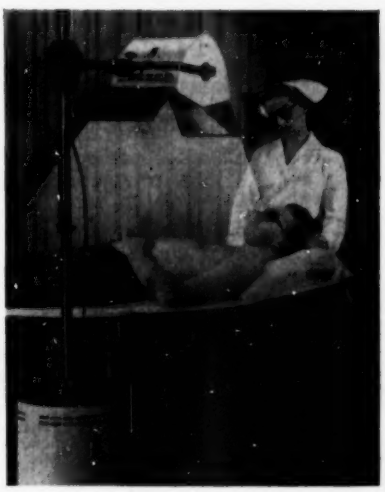

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Volume XXXIV No. 10

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(Formerly Archives of Physical Medicine)

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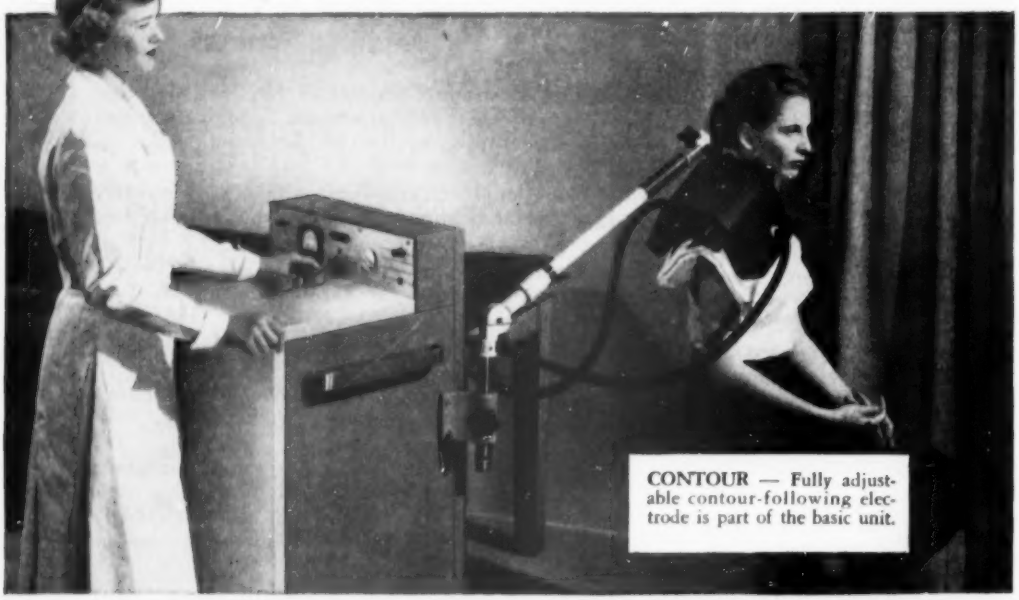

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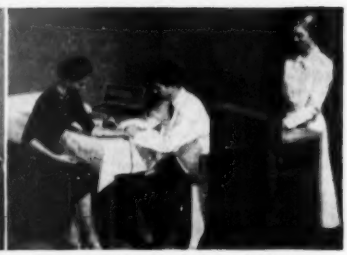

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GENERAL ELECTRIC

The American Congress of Physical Medicine and Rehabilitation: Its Significance and Purpose

WALTER M. SOLOMON, M.D.
CLEVELAND, OHIO

This Presidential Address gives me an opportunity to express my appreciation for the honor of serving you as your President, during the past year. I hope I have served you well. The work has been pleasant and stimulating, the disappointments few, and the cooperation and support from many sources most invaluable and generous. To all I offer my sincere and grateful thanks.

I am proud to be a member of the American Congress of Physical Medicine and Rehabilitation — because of the great and good men I have met during the past seventeen years, and because the organization has had far reaching and significant influence in the establishment and advancement of the practice of Physical Medicine and Rehabilitation.

Our heritage is great. We owe much to the founders and early workers of this organization. It was these men, who not too many years ago, recognized the need of a special field in medicine with skills and techniques, that although not new, had failed to receive sufficient professional acceptance. As a result of the untiring zeal and persevering efforts of these pioneers, the specialty of Physical Medicine evolved.

This organization was founded thirty-two years ago. From an humble origin, it has grown rapidly. Its initial objects have so steadily increased, that today they not only affect the aspects of the specialty of Physical Medicine, but other fields as well. Particularly important is the influence the Congress exerts in encouraging physicians to accept the practice of Physical Medicine and Rehabilitation. Without a sufficient number of competent physiatrists, the specialty would cease to exist. Today the number of physiatrists is not adequate to fill the needs of institutions and that of practice. This is complimentary, but also alarming. Young physicians are now completing their training, so that the number of physiatrists is increasing; however, measures and interests should be found to accelerate the increase in number of well qualified physiatrists. The Congress, by its remarkable functions and activities, cannot help but demonstrate the purpose and significance of the physiatrist.

The Congress is an important force in acquainting other physicians and specialists with the role that the physiatrist plays in the management of patients. It serves as a central point of the country for matters pertaining to Physical Medicine and Rehabilitation. Originally, educational programs, demonstrations and various other efforts were needed to advise and convince other members of the medical profession of the necessity of this specialty, and the advantages to be secured by the cooperation from physiatrists. Fortunately, this missionary stage, experienced by all specialties, has passed. We have now reached the stature where others seek our help and advice. We have come of age. However, much appropriate dissemination of information and creation of good will is still necessary, if misunderstanding and misconception is to be avoided. A united and strong national organization can be a most potent power for more complete recognition and greater respect from all sources.

Among the many functions of the Congress, four of them may be specifically cited. These functions have aided in the past and continue to be dominant factors at present, in the advancement of Physical Medicine and Rehabilitation.

Presidential Address; read at the Thirty-first Annual Session of the American Congress of Physical Medicine and Rehabilitation, Chicago, September 1, 1953.

First, the annual meetings of the Congress: These sessions have changed tremendously in the past decade. The presentation of papers, both clinical and scientific, has reached a high level of excellence. The scientific exhibits furnished by the leading clinics, governmental services, and university centers are a source of information about the latest developments in Physical Medicine and Rehabilitation. The Instruction Seminars are a notable contribution to these meetings; the sessions are eagerly attended by many individuals who find them an excellent means of becoming better informed about all the phases of the specialty. These annual sessions also serve as a meeting place for personal discussions between physiatrists, scientists, specialists from other fields, and other professional and non-professional persons. Here problems of mutual interest may be discussed.

A second influence of conspicuous importance is our publicatidn, the *Archives of Physical Medicine and Rehabilitation*. It is recognized as one of the outstanding journals in this field. It is a source of reference for the latest and most authoritative material pertaining to physical agents and their application, and all phases of medical rehabilitation. Extolling the merits, accomplishments and progress of this journal is worthy of an address in itself. Today it is sufficient to state that it ranks high in advancing the prestige of the specialty.

The third function was the role played by the Congress in establishing the American Board of Physical Medicine and Rehabilitation. The creation of a specialty board demanded, among other requirements, the existence of a strong and well represented organization. The American Congress of Physical Medicine and Rehabilitation is recognized as a society of such distinction.

The fourth and last specific influence, but definitely not the least in importance, is the part the Congress exerts in the guidance of technical personnel. The very nature of the practice of Physical Medicine and Rehabilitation demands the assistance of such personnel. None but the naive will fail to give credit to the large number of capable and loyal therapists who contribute so much to the practice of good Physical Medicine and Rehabilitation. Very early in the existence of the Congress, a small group of members recognized the need of better trained and guided technicians. This led to the formation of the American Registry of Physical Therapy Technicians, now known as the American Registry of Physical Therapists. This move was appreciated and encouraged by the farsighted and ethical therapists, since it was a factor which helped elevate them to a professional level. They became a part of the team in the care of patients. To most members of the Congress, a well functioning Registry is a vital and commendable obligation. The importance the Congress maintains in the guidance and professional supervision of technical personnel, is acknowledged by other new ancillary groups who are seeking recognition and approval. Members of the Congress, comprehending their responsibility to their patients and to the profession, are demanding sufficient training and proficiency of these newer groups. Not until these new ancillary groups are capable of supplying the high quality of work furnished by the present accepted technical assistants, will they be recognized.

Thus having considered the purpose of the American Congress of Physical Medicine and Rehabilitation, it is well to think of means in which its significance may be enhanced. A most potent factor would be to increase the number of members. The Congress should be enlarged so as to include all worthwhile professional and scientific individuals interested in the vast field of Physical Medicine and Rehabilitation. Obviously, every physiatrist should be a member. However, its membership should not be confined exclusively to physiatrists. Since the specialty of Physical Medicine and Rehabilitation cares for patients from practically every branch of medicine, it is essential to its advancement that it receive scientific and clinical information from all interlocking sources. Some

fear that the Congress will lose its identity by inclusion of specialists and teachers from other fields—this is a restricted viewpoint and contrary to the purpose of the organization. Physiatrists must receive aid from investigators in the basic sciences, and the cooperation from orthopedists, neurologists, psychiatrists, internists, and all other physicians. No specialty can operate in isolation if optimal therapy is to be given to their patients. The American Congress of Physical Medicine and Rehabilitation is the natural meeting place for all these disciplines.

Just as the American College of Surgeons is the national organization that represents the various groups of physicians who are concerned with the surgical aspects in the care of patients; the American College of Physicians includes many individuals whose interests are chiefly internal medicine. Thus the American Congress of Physical Medicine and Rehabilitation should be the group representing individuals, whose interests are centered on the use of the physical agents and rehabilitation forces, in the management of patients. The American College of Surgeons and the American College of Physicians do not limit their membership to physicians practicing a limited type of surgery or internal medicine exclusively; neither should the Congress restrict its membership to physiatrists. The American Congress of Physical Medicine and Rehabilitation can humbly take its place with the older and larger organizations of surgeons and internists. Its prestige as yet is not comparable to these two renowned organizations, but with continued progress, support, and the proper leadership, it will reach the prominence enjoyed by the aforesaid groups. The suggestion has been made that our name be changed to the American College of Physical Medicine and Rehabilitation. To change the name offers no serious problem—it has been done in the past. However, merely changing the name does not automatically bestow added distinction. The right to be accepted by the medical profession and the public, as a counterpart to the American College of Surgeons and the American College of Physicians, demands definite obligations and accomplishments. An honor involves a responsibility that must be earned. This is understood by all sincere and conscientious members of the Congress.

Included in the group of the four most influential factors of the American Congress of Physical Medicine and Rehabilitation for the advancement of the specialty was the annual session. In addition to this meeting, another means of increasing the significance of the organization is the expansion of its activities at the "grass roots" level. The Congress today has various regional groups. In many instances in the past, these groups have not been as constructive and influential as might be desired. These sections should be the representation of the Congress in that particular locality with all the responsibilities and duties of the parent organization. Occasionally the Section's activity consisted of a scientific meeting which was too often hurriedly evolved and attended by a minority of members. The importance of such meetings is not to be minimized; however, additional functions can be employed which will also aid the field of Physical Medicine and Rehabilitation that may be most pertinent at the local level. Education and indoctrination of the purposes and values of physical medicine and rehabilitation can be presented very effectively in regional groups.

Today, a few of the larger cities have local societies of Physical Medicine and Rehabilitation which are independent of the Congress. Should similar groups be formed in other communities, wherever a group of physicians, not physiatrists exclusively, could be brought together to discuss physical medicine and rehabilitation? And should all these local groups be affiliated in some manner with the national organization? All the advantages for the sectional groups would be augmented at this local level. The national organization could support, but not necessarily control, the local societies. Such a plan would be comparable to that of the American Medical Asso-

ciation. The headquarters would be centralized. The Sectional groups would correspond to the state societies of the American Medical Association; and the local societies would operate with a purpose similar to that of the county organizations of the American Medical Association. This expansion of the Congress should be studied as a future development.

The functions of the American Congress of Physical Medicine and Rehabilitation require the efforts of most of its members. Fortunately our organization includes many outstanding and brilliant physiatrists, scientists, teachers, and other great medical specialists. Fortunately, it also includes others of less fame whose efforts and talents are essential in furthering the aims of the group. Contributions are expected from many. In matters of research, not all members have elaborate laboratories at their disposal to carry on costly and time-consuming experiments. We can be truly thankful that certain clinics and centers have these facilities and utilize them with such notable success. Most all physicians can be clinical investigators to the extent of their time and inclinations. Many more investigators are needed in the field of Physical Medicine and Rehabilitation who are good observers, and have the willingness to disseminate their knowledge to others. Let us hope that the various centers and clinics will continue with their extremely important scientific investigations, but let us also encourage the modest and worthwhile endeavors from any and all sources.

A greater number of our members should consider it a privilege, as well as an obligation, to attend the annual meetings and to participate more energetically in its various activities. Our members should also invite other physicians and interested persons to be our guests at these annual meetings. In addition to attendance at the annual meetings, other services and requirements are needed, both impressive and humble. Particularly important are the numerous committees which demand the time and energy of its members. The older committees function well with their work and inspiration that permits the Congress to operate more effectively and progressively. Other committees have been recently formed to help solve new problems; for example, the Committee on the Correlation of Physical Medicine and Psychiatry; Committee to Study and Advance the Knowledge of Braces, Splints and Prostheses; Committee on Ethics; Committee on Rehabilitation Centers; Committee for the Coordination and Integration of Physical Medicine and Rehabilitation in Geriatrics, and others. A certain number of members are appointed officially each year according to the Constitution to serve on these committees. However, every Congress member should consider it his or her responsibility to assist these committees in every way. Committee members require and expect help from many members of the organization. A well established organization becomes stronger when more and more members take a sincere and active interest in fulfilling its objectives.

The future of the American Congress of Physical Medicine and Rehabilitation is bright indeed. Its glorious past and present attainments are stimuli to greater accomplishments. To bask in the glories of the past is not enough. We must expand our energies. We must increase our efforts to improve the knowledge of our facilities. We must apply this knowledge for the more perfect management of our patients. Our goal is set high as the organization associated intimately with the progressive and expanding specialty of Physical Medicine and Rehabilitation. We can look forward with confidence and hope to greater achievements in the future.

Vocational Counseling with the Severely Handicapped

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Introduction

A severely handicapped individual is generally one who cannot be rehabilitated through the usual procedures and facilities established for general community use. He requires additional specialized facilities and a combination of services over an extended period of time. In this respect, it is hoped that this paper will imply throughout the concept of rehabilitation as a composite science, "bringing into focus all of the various professional services required by a disabled . . . adult to achieve normal living."[1]

Vocational counseling provides an opportunity for the counselee to grow in increased self-understanding of his interests, aptitudes, skills and capacities. Through the vocational counseling process, the individual is able by increased insight to choose the training or retraining commensurate with his abilities and interests; the objective being development of ability to secure suitable placement as a result of his developed skills in a specific vocational or occupational area; to follow realistic goals as a result of the permissive relationship of the counseling process, and to progress positively through his increased understanding of himself.

Previous treatment of the subject of counseling with the handicapped has concerned attitudes of the employer[2], the vocational counselor's role in a hospital setting[3], standardized aptitude and interest testing[4] and the values of the teamwork approach in rehabilitation.[5] Other articles and discussions have stressed early vocational preparation for the very severely handicapped[6], community services for the severely handicapped[7], industry's role in rehabilitation[8], and occupational exploration in vocational counseling.[9] The importance of these various topics is not to be minimized; but there is a constant need for additional suggestions or techniques in specific regard to counseling with the severely handicapped.

In many instances, for example, the vocational counseling of the severely handicapped becomes part of the habilitation program rather than the rehabilitation process. The severely handicapped adult with whom one is working is often the cerebral palsy or polio child of yesterday. His work experience is a void, and his school environment is usually within the protective atmosphere of the home. As will be pointed out, the narrow range of his experiences with occupations or occupational information as well as his very limited knowledge of employers or employees emphasize his need for habilitation rather than rehabilitation.

Habilitation of the severely handicapped may even include travel directions through accepted landmarks in the city in which the counselee lives. Recently, one of the graduates of the Institute for the Crippled and Disabled's Optical Mechanics Class was referred for selective placement with a firm two blocks from Times Square, New York. The trainee had been attending the Institute for one year, and had lived the last twelve of his nineteen years in lower Manhattan. His ambulation was better than average, for he rode the subways: his diagnosis was Erb's Paralysis. He had never been, however, to Times Square, and another student was required to take him to the firm of the employer who had requested a beginning surface grinder. Of average intelligence, his maturation had been

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slow because of a protective familial atmosphere, which somehow had excluded Times Square from his fund of experiences.

The severely handicapped person may have incurred his injury through accident or disease as long as ten years prior to his referral for rehabilitation. He may have developed a considerable amount of negative attitudes, and may have come to accept his physical limitations rather than making an effort to determine his remaining potential skills or aptitudes for training or retraining. Vocational counseling again with these cases necessitates that the counselor pierce the resistance of the accumulated years of stagnation.

Although 80,000[6] workers are permanently disabled in industrial accidents each year, in 1950 only 7,000 of those cases received vocational rehabilitation services from the State-Federal Divisions of Rehabilitation. Funds are limited, and the various States work strenuously to the limit of their budgets as well as their resources. Of those 7,000, only 1,300 were covered by workmen's compensation. Seven years was the *average* time that had elapsed between the onset of their disabilities and the provision of rehabilitation services. The recent January 25, 1952 Report of the Task Force on the Handicapped from the Office of Defense Mobilization states "there are too few places in which these services (composite elements of effective rehabilitation) are actually brought together and effectively put to work in a common effort to serve an individual who is a handicapped person. It is here, in the individual community, that the greatest opportunity exists to muster the full force of local talent and energy to meet the needs of the disabled and to bring them into the local labor force."

The purpose of this paper is to discuss certain aspects of counseling the severely handicapped, which may prove to be helpful to those participating professionally in the rehabilitation process. While the nature and method of each procedure is related professionally to the discipline of vocational counseling, an awareness of what other professional team members are attempting to accomplish provides a more successful theater of operation in which the client is to be served by all in teamwork relationship. Dr. Frederick A. Whitehouse points out that teamwork in a total rehabilitation center "is a close . . . multiprofessional union devoted to a common purpose—the best treatment for the fundamental need of the individual."[7] Two aspects of vocational counseling with the severely handicapped will be covered: job-task assignments and role-playing.

Job-Task Assignments

The aptitudes and interests of the nonhandicapped individual have been fairly well covered by a variety of tests readily available to the vocational counselor and guidance worker. Since World War II, the Veterans Administration Advisement and Guidance Programs have given considerable impetus to the utilization of aptitude tests, interviews, and other techniques in the guidance and counseling field. The various State Employment Service Offices use the newly developed General Aptitude Test Battery, which covers various occupational fields. The increased usage and popularity of test administation as well as the increasing coverage of aptitude and skill areas through new tests by competent users have added to the various means by which the individual can be aided in arriving at a more realistic vocational goal.

Unfortunately, the usual standardized test, except for a very small minority and except for specialized research in the area of the blind and blinded, does not include norms or significant data which can be related to other severely disabled individuals. Such elements as speed, adjustment, approach, use of two unimpaired hands, need for unimpaired vision and others account for extremely low scores on these tests by the severely handicapped.

To standardize existing tests for the severely handicapped would be indeed a difficult task. One would have to take into account the diagnosis, the degree of limitation, the length of time of dis-

ability, and many more variables. Degrees of injury and residual capacity are many. It would be difficult to classify scientifically for the majority of the existing aptitude tests comparable groups among the different medical diagnoses.

Perhaps more important, many tests have derived their standardization from the testing of large groups of workers in the occupational fields for which the specific aptitude tests were devised. But for some of the severely handicapped, a single placement in one job area may be the signal achievement for that particular handicapped group. In working with the vocational counseling of a woman of thirty-six with a right hemiplegia, I have often wondered how many others had been placed in the particular job area where she has had some success. Sustaining a severe aphasia, she received psychological retraining, social casework, occupational and physical therapy, and sheltered workshop activity along with her vocational counseling. While she was capable of operating the Merrow sewing machine, which involves the utilization of only one hand and one foot, her interest lay elsewhere. She had been an excellent saleswoman at one of the most demanding department stores in New York City prior to her accident, which was five years before she was referred for total services. Her recovery excluded the use of her right hand for fast writing; difficulty in mathematical concepts was also present.

Her insistence upon seeking restaurant hostess work was not denied, however, when the professional team working with her recognized this need as an important one in her return to normal functioning. Within the framework of a permissive relationship, she progressed with her rehabilitation to a point where she was able to sustain restaurant hostess work despite existing aphasia. Physically she looked the part, and she was able to do this type of work with an understanding employer.

But are there any other aphasic restaurant hostesses? The problem of standardizing a type of test which might include occupations for aphasics presents obvious problems immediately. Again, one considers the varying degrees of residual impairment of any disease or injury, and the problem increases. In addition, the Baruch Committee on Physical Medicine[12] indicated that one disability affected the individual's entire behavior, his attitude, emotional responses, recreational interests, family and social life. Emotional disturbances are sometimes precipitated by a severe, crippling accident or disease; or a personality difficulty may be aggravated by disease or injury.

While many of the usual standardized manual dexterity tests, mechanical, and clerical aptitude tests are administered at the Institute, the results invariably reveal non-significant scores. Most skills demand the use of two good hands, and mechanical dexterity tests are in part predicated on that assumption. The hand or arm amputee is thus at a disadvantage. The hemiplegic or arthritic do poorly on the standardized assembly type tests. The cerebral palsy patients are bothered by poor eye-hand coordination, or if they achieve correctly and accurately, do so at a pace hardly commensurate with the scores demanded by the tests for significant levels of achievement in order to indicate suitable occupational fields.

Mr. Jay O'Brien, at the Institute for the Crippled and Disabled, has devised a series of job-task assignments or work samples which are directly related to the various trades taught in the training classes at the Institute. The severely handicapped individual, d u r i n g the counseling process, is referred to a Guidance Test Class, where for a period from two to four weeks he is given the the opportunity to explore his capacities and skills in such trades as jewelry mechanics, optical mechanics, leathergoods, commercial art, welding, typing and switchboard, e l e v a t o r operating and sheltered workshop tasks, as well as sewing machine work. Here, the client has the opportunity, under expert supervision, to engage in the actual activity of the trade, utilizing the tools and the materials, sustaining an eight hour day standing or at a bench. Here, too, he

is experiencing the atmosphere of shop, since he works with others and the elements of production and competition are present to some degree. The level of achievement is placed on a vocational rather than on a prevocational status.

By prevocational status is meant the atmosphere and environment of the occupational therapy shop where the client works on a therapeutic basis rather than on a vocational one. Perhaps it should be pointed out that while the focus of prevocational work is vocational, the purpose is more therapeutic than in the Guidance Test Class, or in the actual training class. The prevocational atmosphere allows essentially for the tolerance exploration and specifically prescribed therapeutic achievement of the severely handicapped. His products accomplished in the occupational shop may be superior to the work of a student in a training class. But how long did it take him to finish his work? How much individual attention was given him? Did he connect the work with a transfer of skills for outside competitive employment? These questions are not asked for any defense argument. Prevocational service is an integral part of the many services to be given the severely handicapped person during his total rehabilitation. But often the severely handicapped person's work at this stage may be interpreted vocationally to mean a return to employment, when speed and production have not been considered.

A hospital situation may not allow for a Guidance Test Class setup as will be further described. In the development of a rehabilitation center, a vocational training department would offer immediate class room instruction for the severely handicapped person upon the conclusion of his Guidance Test Class exploration. The various trade training classes at the Institute for the Crippled and Disabled were specifically chosen because of the availability of placement on the outside for the severely handicapped person. The potential for success in any of the training classes is determined in the Guidance Test Class.

In the Guidance Test Class, the various phases of each trade are broken down into a job analysis of the various tasks or assignments of a total job to be completed. Initial job-tasks concern the utilization of the simpler tools of the trade. One guidance test has to do with aptitude for using a ruler. Strangely enough, many instances have been found where a client may have scored significantly high on a standardized test of arithmetic fundamentals, but his ability to use a ruler correctly is sadly impaired. In most trades it is necessary to know how to read and use a ruler accurately and quickly. This accepted procedure is difficult for the former heavy construction worker or laborer whose academic training was limited, or whose background includes a foreign language difficulty. In many cases where the adult's childhood disease required home teaching, he may not have had the constant use of the ruler which daily attendance at public school usually provides. Such problems as these continually arise in the counseling process with the severely handicapped at the Institute but are only occasionally found in rehabilitation literature.

In the Guidance Test Class, each job-task prescription includes, on one side of the assignment the directions for the task; on the other side, illustrations are carefully presented, so that a minimal amount of instruction is necessary from the counselor. From these job tasks, the counselor has ample opportunity to observe the individual's ability to read and follow simple directions. Furthermore, he has the chance to observe work habits, work tolerance, and ability to sustain any set task. Perseverance and distractibility can be observed and judged throughout the individual's tryout in the Guidance Test Class. The room has the appearance of a training class, but each individual in the small group may be working on a different job task.

During the individual's stay in the Guidance Test Class, his work includes a visit to the actual trade training classes which are on the same floor. In this manner, he has the opportunity to see the

class at work, observe the various types of projects on which class members are working, and receive a clearer picture of the physical demands of the work. He is also able to see any adjustments being made by those with varying types of disability who may be approaching machinery or bench work in different ways. If there is any question in the Guidance Test counselor's mind about the capacity of the individual for a certain type of work, he is tried out in the actual trade training course under the supervision of the instructor in charge. This is particularly true of the management of some of the larger operating machines which may not be duplicated in the Guidance Test Class. In the optical mechanics class, the machinery involved is of a large, stationary type, and individuals are usually given their job-task assignments in the actual class.

Since the Institute for the Crippled and Disabled has its own Sheltered Workshop on the second floor, job-task assignments of this type are also included in the Guidance Test Class procedure. The Sheltered Shop tasks include collating, pasting, packing, Merrow sewing machine operating for one handed individuals, Singer sewing machine operating, and assembly tasks comparable to light factory assembly on the outside. Training is also included for shipping and receiving clerk, and clerical inventory work.

Among other reasons, referral to the Sheltered Shop may be: (a) to build up work tolerance for placement in competitive work on the outside; (b) for training in either Merrow or Singer sewing machines; (c) for adjustment to light factory assembly work prior to outside placement; (d) for ability to sustain work capacity and interpersonal relationships with other workers; (e) for possible terminal employment for the marginal worker either because of personality problems, physical problems, or a combination of both, and (f) for a refresher course. The job task assignments for the Sheltered Workshop are carefully observed for rate of production, speed of performance, perseverance, and the interest in, as well as aptitude for, sedentary work of this nature.

Judgment and appraisal of work performed in the Guidance Test Class are based on five classifications: superior, above average, average, below average, and inferior. Placed around the walls of the Guidance Test Class room are many different examples of work in all of these categories. The individual can compare his work against these graded examples in order to test his achievement at any stage of his specific job task assignments.

The classifications or criteria of appraisal are purposely fairly general. A rating of below average may not necessarily exclude someone from referral to a training class in that occupational area. Final decision is made only through a pooling of all information about the individual, not merely from his specific ratings in the Guidance Test Class. The results of the individual's clinical testing by the clinical psychologist, the social study by the caseworker, the medical information from examination, the results of physical and occupational therapy and the observation and vocational analysis by the vocational counselor are combined with any other information before any decision is finally made. Certainly no professional discipline within a rehabilitation center can afford to disregard the wealth of information gathered by all who work with the client. The team of professional workers who have worked with the individual pool their findings for the most practical solution. The individual becomes an important part of his planning, and his ability to function forward is utilized by all who are in professional touch with him. The decision vocationally is an integral part of the vocational counseling process through which the client's thinking is crystallized into long range planning. Only through a dynamic interplay of interpretation and teamwork coordination can optimum results be achieved for any severely handicapped individual.

The job-task assignment offers practical application of the client's skills and potential capacity for achievement in the Institute's trade training classes as

well as in its Sheltered Workshop program. Personality difficulties indicated in the clinical psychological testing or in the social case work approach may be revealed in aggravated fashion during the vocational exploration in Guidance Test Class. Physical limitations which may crop up during a full day's period may not have revealed themselves during therapy sessions in the medical department. More and more the severely handicapped become aware of their residual occupational capacities rather than their physical limitations in the Guidance Test Class. And since the trades taught at the Institute were initiated because of placement opportunities in the New York City area, the severely handicapped are able to become a part of their own long range planning, and can function on a mature, realistic, vocational plan.

Guidance Test Class offers a vocational testing technique that is unusual in scope and guidance possibilities. In a total rehabilitation center offering vocational trade training, its value is exceedingly great. For application in other rehabilitation areas, six important suggestions are offered: (a) any guidance test class must be closely coordinated with the industries or trades of the surrounding vicinity; (b) the guidance test class should also be closely coordinated with trade or clerical *training* available in the nearby community, or available in the community to which the individual returns; (c) guidance test class should be of a dynamic nature, changing the types of practical job task assignments with the needs of the industrial community, or the needs of the available trade training classes in the community to which the severely handicapped will be returning; (d) guidance test class must be carefully coordinated with other professional disciplines so that the individual may be seen as a whole person —a dynamic, growing personality; (e) the job-task assignments must be judged according to the trade or clerical demands, including a careful appraisal of speed, tolerance to the work, consistency of performance, and adequate production of a finished product; (f) guidance test class may not be an area for providing practical testing in the professions which might involve long range schooling plans prior to entry into the occupational field, and (g) a below average rating for the severely handicapped individual may not necessarily rule out referral of the client to that specific trade training, for his achievement must be considered along with all phases and aspects of his potential capacities as well as his obvious limitations.

Role-Playing

Once the severely handicapped individual's aptitudes and interests have been explored in the Guidance Test Class, and his decision has been made vocationally with the assistance of professional team members, his training begins. Very often, however, the results of the Guidance Test Class may indicate the need for additional prevocational assistance. When this occurs, the client receives additional therapy until it is felt that a vocational revaluation is in order. And then again through an interplay of professional information and interpretation, the individual reenters Guidance Test Class for more vocational exploration.

Before completion of his training, considerable discussion is held with the trainee regarding his eventual placement in his chosen occupational area. The vocational counselor attempts to explore with him his feelings about placement, his confidence in his ability to sustain employment, and practical problems such as working hours, salary, and employer-employee relations. It is at this point that the severely handicapped person's reaction to his disability may provide a springboard for the technique of "role-playing." In role-playing, there are a number of distinctive characteristics which will help the severely handicapped prepare for his job interview with a prospective employer: (1) role-playing is concrete and realistic —probably as close as possible to the actual situation; (2) it is a flexible situation wherein the participants can change roles and participate in a wide range of situations, and (3) it stimulates participation and

affords an experience for the release of any feeling and tension in connection with the job interview and part of the job seeking process. Role-playing provides an excellent opportunity for the severely handicapped to recognize their deficiencies in interview situations, allowing them to profit by errors in approach, in thinking, and in action. Their motivation or lack of it may be easily discernible in their approach to an employer. Their inability to make a simple appointment by telephone with a prospective employer may be an initial stumbling block.

Miss L., twenty four years old, had sustained a severe attack of poliomyelitis when she was three. She had received only home instruction but was graduated from high school. At the Institute she had progressed from a wheel chair to crutches and braces and was graduated from the Office Practice Class with proficiency in stenography, switchboard operation and office machines. After her Guidance Test Class exploration and her training which followed, she had also received some job training in some of the Institute offices as well as at the busy Institute switchboard. But she had had no actual work experience when counseling proceeded toward selective job placement during her training period.

The comfortable atmosphere of the Institute had provoked little motivation toward desiring outside placement. But she had verbalized her willingness to attempt work in an office close to her home in upper Manhattan, where taxi transportation would not be prohibitive. Previous vocational counseling had not brought to light her fear of the initial job interview. Her anxiety in this regard made it very difficult for her to function even in making the telephone call for the interview. The employer had asked that the applicant telephone for the appointment so that he might be able to hear her voice. This was important, since some of her duties would be the use of the telephone for order taking.

Despite Miss L's practical experience with the switchboard over a period of three months, it was apparent that her success on the board was due to her superficial contact with the users of the board. Then too, she knew many of the users of the board at the Institute, and the familiar sound of their voices was reassuring to her.

The idea of role playing was suggested to her. She would phone me from the the next room, and I would act the role of the employer—she would merely play herself this time. This type of beginning of role playing is usually easier for one to accept at first. The following conversation showed that Miss L.'s fears about her ability to make an appointment were well founded:

Employer: This is Mr. Smith speaking.
Miss L: How do you do.
Employer: This is Mr. Smith speaking. Who is this please?
Miss L: (Silence)
Employer: May I help you? Hello? Did you wish to speak with me?
Miss L: Yes—I—did.
Employer: Perhaps you wanted to speak with Mr. Jones?
Miss L: No.
Employer: What is it you want? I can't hear you.
Miss L: Could I see you sometime?

The rest of the conversation was as aimless as the above. Miss L. was discouraged, but admitted that after the conversation started the employer didn't seem to say those things she expected him to say. But what were the things she expected him to say? Miss L. wasn't too sure, but agreed that she might like to try it all over again. This time it was suggested that she be the employer, and say those things which she had expected him to say to her. Miss L. then became the employer and I was to be the applicant—or Miss L. The conversation went approximately like this:

Employer: This is Mr. Smith speaking.
Miss L: This is Miss L. Mr. U. suggested that I get in touch with you.
Employer: Was that about a job?
Miss L: Yes. I would like to make an appointment at your convenience to see you.
Employer: Have you had any experience?
Miss L: No, I haven't, but I did not think that experience was required.
Employer: Well, no—it really isn't. What is your typing speed?
Miss L: Around 45 or 50 words.
Employer: And have you had any experience with a mimeograph machine?
Miss L: Yes, I have run the one at the Institute very often.
Employer: When could you come up to see me?
Miss L: Any day that would be convenient for you.
Employer: Would Thursday at 2 p.m. be all right?
Miss L: Yes, thank you, that would be very fine.
Employer: All right. I'll see you at that time.
Miss L: At 2 p.m. on next Thursday. Thank you very much.

For several days, role-playing with the

use of the telephone gave Miss L. sufficient courage eventually to make her phone call to the employer with a feeling of satisfaction. After this hurdle was taken, role-playing in the actual employer-applicant set-up was worked on for some time. A series of role-playing interviews finally gave Miss L. the experience necessary for her appointment, and in the actual situation she survived the ordeal by getting the job.

We have found again and again at the Institute for the Crippled and Disabled that although the severely handicapped individual has accepted vocational training or retraining, any discussion of job placement is accepted intellectually only until selective placement becomes a reality—and then any discussion is anxiety provoking. Frances Upham[4] carefully treats the meaning of illness, and the disabled individual's reaction to his physical limitations. She states that the whole experience of illness and care may stir up repressed fears of inadequacy. These fears are multiplied when the severely handicapped individual is faced with his return to the normal competitive world of work, which he may have left many years ago at the onset of his illness: The severely handicapped adult who has been handicapped since birth, is entering a strange world which presents unknown problems and terrifying adjustments.

The employer may not be as permissive and accepting as his associates in the family, the hospital, or at the rehabilitation center have been. On the other hand, he may never have accepted the limitations of his disability, and may not be prepared for the level of attainment with which he must start. Light factory assembly work for the former well paid construction worker does not carry the financial return of his previous work. Transportation difficulties beset the paraplegic and the cerebral palsied, many of whom must use taxi service to and from work. These are only a few of the problems.

As just pointed out, it has been found that in placement counseling with the seriously handicapped, it is the initial interview with the future employer that is disturbing. The ability to answer questions properly as well as ask them intelligently is far more a problem here. Those who have not accepted their disabilities sufficiently well to function maturely, sit awkwardly to hide defects, or keep a disfigured hand obviously hidden during the interview. Cosmetic prostheses are only superficial aids in these moments of stress. These fears and apprehensions cannot be dissipated purely by a discussion of them. Role-playing is especially helpful in allowing for a transition period between the classroom atmosphere and the reality of the interview situation.

Role-playing, however, should not be utilized indiscriminately. It may be apparent during the role-playing that the severely handicapped person may not be able to sustain employment — that his anxieties should be worked with intensively on an individual basis, or through group therapy with qualified professional personnel. The vocational counselor should be sufficiently alerted to the personality problems and maturity level of the client to recognize that a seriously disturbed individual will not be able to adjust to job placement or an interview, much less to the technique of role playing. Again the total rehabilitation center services provide an atmosphere where the counselor can discuss with the psychiatrist, the psychologist, or the psychiatric social worker the personality of the severely handicapped individual. Timing is of the utmost importance.

It is not meant to imply that the client passes from the Guidance Test Class to Trade Training directly to selective job placement, or from one stage of rehabilitation to another without the assistance and interplay of other professional services. This interrelation of all services will serve to correct any poor timing in the long range planning and program of the severely handicapped. The individual must at all times consider himself an active participant in his planning.

Through role-playing the individual has the chance to learn by activity, and to sustain sufficient experience for a

carry over into actuality. Some surprising results have occurred during its use as a technique in placement counseling with the severely handicapped. On one occasion, during an interview of role-playing, the girl seeking the position requested of the prospective employer a two week vacation period prior to the start of the job, since she had just finished her training course and wished a short rest period! During another role-playing episode, the interviewee mentioned that he had never enjoyed his course work, and wondered what other occupational area the employer might suggest he look into.

Summary

An attempt has been made to highlight two techniques or plans which have proved to be of value in the vocational counseling of the severely handicapped: job-task assignments and role-playing.

Mr. Jay O'Brien at the Institute has devised a series of job tasks which are directly related to the various trades taught in the training classes at the Institute. The severely handicapped individual has the opportunity under the supervision of a vocational counselor to engage in the actual activity of the trade, utilizing both the tools and materials. Work habits, work tolerance for a full day's production, perseverance, distractability, interest and aptitude are among some of the aspects that can readily be observed through the Guidance Test Class in which the job task assignments are utilized rather than the standardized test batteries of aptitudes, skills and interests. The job task assignment offers a practical application of the client's skills and potential capacity for achievement in the training class which may follow or the sheltered shop, unless a return to the prevocational stage for the individual is indicated.

It is believed that for the severely handicapped, role-playing can be a rich experience as a technique in helping the severely handicapped prepare for initial employer interviews. The individual can learn from his own experience; his mistakes are evident by the replies to his statements; his success can be judged subjectively by his own feelings of attainment at the end of the interview. The proper timing for role-playing cannot be underestimated. With the coordination of all other professional services in working with the severely handicapped, this technique can be effectively utilized.

The return of the severely handicapped person to economic usefulness has been the goal with which this paper has been most concerned. There are of course, other goals for these persons. However, it is hoped that the two techniques discussed will be helpful to both vocational counselors in their relationships with their clients, and to other professional personnel in a better understanding of their vocational problems.

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Coordination of Plastic Surgery and Physical Medicine in the Paraplegic Patient

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Much has been written concerning the management of decubitus ulcers in the paraplegic patient.[1,2,3,4] Little mention is made, however, of the complete cooperation and coordination between physiatrist and plastic surgeon necessary to treat and rehabilitate the paralyzed person. Prolonged bedrest and restriction of activity is physiologically and psychologically deleterious to the paraplegic patient. Unfortunately plastic surgery, and particularly that requiring multiple procedures, necessitates long periods of relative immobility. Inactivity can be definitely minimized and physical reconditioning achieved by a well planned medical and surgical program.[5]

Problems of combined responsibility have been clarified by a review of our experience in the clinical management of well over one hundred paraplegic patients. Many of those cases have required multiple plastic surgical procedures. The responsibility of solving these surgical problems must be shared first, in the design of skin flaps and grafts; second, in the timing of each plastic surgical procedure, and third, in carrying out physical rehabilitation between operative procedures.

In the design of plastic repairs, certain basic physiologic and anatomic principles exist. These fundamental surgical considerations can and must be fitted into the total scheme of repair; this has as its prime consideration the total rehabilitation of the patient. When this viewpoint is adopted, plastic surgery becomes a type of reconstructive surgery necessary to equip best the severely disabled patient for his rehabilitation goal.

Every pressure sore does not require surgical intervention. Small superficial ulcerations and, indeed, even most deeper decubiti will very gradually granulate and epithelize under ideal circumstances. Nevertheless, once the skin continuity in a paraplegic patient has been interrupted and a decubitus ulcer ensues, it is necessary to decide to institute conservative therapy or to launch upon a program of surgical reconstruction. The following factors should be considered in planning each patient's course; first, much hospital time and nursing care may be saved by the early surgical closure of a large ulcer;[6] second, the attainment of a well healed wound at the earliest possible moment by surgical repair may stop the patient's progressive disability and deconditioning; third, decubiti which have healed by epithelization only to break down repeatedly following insignificant

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trauma, should be repaired since constant wound stimulus may lead to excessive keratin formation and occasional malignancy,[7] and fourth, areas that are to bear the brunt of the patient's weight and be subjected to the bulk of daily trauma should be given the advantage of repair.

Conservative therapy is indicated in dealing with early ulcerations in areas which will not long be the focal pressure point. For example, the skin over the elbow may break down during the early period of confinement to bed. There is little indication for repairing such an area when it can be anticipated that the patient will soon be up in a wheelchair and that not many weeks will elapse before he can be braced and ambulated. The anticipated rehabilitation goal is an essential factor in this decision. This fact has been very strikingly emphasized by the decreasing number of sacral ulcers that are seen today in contrast to ten years ago. At that time, the paralyzed man could anticipate spending the greater portion of his existence on his back. Today this is rarely an acceptable goal for most paraplegic patients. Wheelchair existence and bracing have brought new aspects to the pressure problem. A sacral ulcer may be healed by conservative means. Though the surface is covered only by scar and epithelium in the completely ambulatory patient, the area is thus no longer subjected to anything but minimum trauma. On the other hand, a superficial ulceration on the buttocks represents an adequate indication for a radical repair of the ischial areas if a prolonged wheelchair existence can be anticipated. Where bracing and standing will be minimal, a prophylactic removal of the prominent ischial tuberosities is usually indicated. Eventual bracing and ambulation necessitates certain specific considerations in the mapping out of any surgical reconstructive program. The removal of bony prominences and resurfacing with thick pedicle flaps of skin and subcutaneous tissue are indicated in those areas subjected to greatest daily trauma.[8] Spontaneous epithelization does not hold up in such areas. Even split thickness free skin grafts do not do well in such regions. Flaps of skin to be used in repairing one area should not be taken from a zone that is later to be subjected to major stress and strain. Further, a split skin graft is best not removed from a region that will be rubbed or otherwise traumatized. The donor site of such a graft heals by epithelization.

The application of braces of various designs may cause pressure or irritation points that must be considered in skin flap design. It appears pertinent to review these principles as they apply to several types of more commonly employed braces. Back braces of the Knight or Taylor design, with their rigid uprights, may create pressure points and irritation over the sacrum. If the patient is to require this brace for upright posture, then it is well to repair the sacral ulcer or the poorly epithelized surface, with a thick flap repair. A split thickness skin graft will not satisfactorily cover such an area. Semi-rigid corsets can be constructed and applied in some instances so as not to cause any local areas of pressure. Epithelized surfaces may at times tolerate this minimal trauma. In general, a flap repair is indicated if a back brace of any design is to be continuously needed for standing. A pelvic band may produce pressure or irritation over the lower sacral areas as well as on the anterior superior iliac spines. Bony prominences over the sacrum and even the iliac spines may have to be removed in such individuals.

There is no contraindication to the removal of the ischial tuberosities even if it is determined that the patient is to be fitted with ischial weight-bearing long leg braces. Indeed, such a decision may constitute the indication for the radical removal of bony prominences in this area. Ischial weight bearing requires a large firm bulk of healthy tissue that is able to withstand trauma rather than any specific bony prominence.

The exact position of the upper and lower thigh cuffs determine the design of repair to be used over the trochanters. Flaps definitely should not be shifted from those portions of the thigh over which the cuffs will press and rub. Fur-

thermore, it is important not to obtain split skin grafts from those parts of the thigh that will later be beneath a leather cuff. Calf cuffs, wherever possible, are probably best not used anteriorly. Breakdowns over the tibia are often difficult to heal. Repair of these areas over the anterior tibial bone are technically difficult in the paraplegic. This is a difficult area to repair even in the otherwise normal individual.

Fig. 1—This patient shows sacral, ischial, and trochanteric reconstructive flap repairs so planned as to give maximum skin and subcutaneous tissue covering at the points of maximum pressure of the braces. Skin grafts have not been taken from any skin or brace pressure sites.

The patient depicted in figure 1 had plastic repairs of the sacral, ischial and trochanteric regions. The sacral flap has its base below, so that the grafted donor site lays over the gluteal muscles. Both ischial tuberosities have been removed, creating a cushion effect in this area. The trochanter reconstruction entailed removal of the bony prominence and resurfacing with a thick flap rotated from the groin. Vital areas have not been used as donor sites. Pressure points are gone. Areas receiving maximum trauma are covered with thick flaps.

After a decision has been reached concerning the details of design of various plastic surgical procedures, the physiatrist and plastic surgeon should cooperate in planning the timing of each procedure with respect to the patient's overall rehabilitation program. It should be stressed that the plastic repair of a decubitus ulcer is a major surgical procedure. Many patients require five or six operations, with the associated anesthesia, blood loss, and deconditioning necessitated by major surgery. In our experience, hospitalization is considerably prolonged and the results less successful if these procedures are attempted before the patient is placed on a rehabilitation and reconditioning program. Patients undergoing plastic surgical procedures do not do well postoperatively if they have been bedridden for months or years in a state of marked physical deconditioning. Wherever possible, therefore, bed exercises, selfcare activities and even ambulation are prescribed before major plastic surgical procedures are attempted. More rapid healing of the skin flaps and less hemorrhage have been observed in these patients than in cases where plastic repairs are attempted in the deconditioned, bedridden patient.

In planning plastic repairs on a patient with multiple decubiti, the surgeon must consider many factors. The presence of flexor spasm in the lower extremities, for example, may make it impossible to prevent pressure and irritation over the sacrum during the postoperative period. Thus, multiple tenotomies or neurectomies may be indicated in order to remove spasm before plastic repair of the sacrum becomes feasible. Attention must be given to other bony prominences, such as the trochanters or anterior iliac spines before attempting a sacral repair. This is necessary in the patient who will be restricted to side lying or face down position for several weeks postoperatively. In planning multiple procedures, it must be borne constantly in mind that bony prominences in other areas will be subjected to greater stress during the postoperative period. This is particularly important if more than one area is repaired in one stage. For example, repair of sacral decubiti can be planned simultaneously with removal of the ischial tuberosities, since it will allow the patient to remain in the side lying or face down position. On the

CHART 1: Program of total rehabilitation for a paraplegic patient. Major surgical procedures, physical training, self care activities, prevocational and educational objectives were carefully correlated. D. T. Paraplegic Age 17

DATE	OPERATION	REHABILITATION STATUS
February	Tenotomy, hip	Upper extremity and trunk exercises
March	Debridement, sacral ulcer	
	Sacral flap prepared	
April	Sacral flap shifted	Self care activities started
		Educational — prevocational program
May	Neurectomy	Braces measured
June	Multiple tenotomies	Ambulation in parallel bars
		Ambulation with axillary crutches
August	Exc. lt. ischial tuberosity	
	Left hip flap prepared	Ambulation with Loftstrand crutches
September	Left hip flap shifted	Stair climbing
October	Exc. rt. ischial tuberosity	
November	Scar excision, right thigh	
December	Left Achilles tenotomy	Self care activities completed
January	Debridement, left hip	Educational objectives completed
	Closure, left hip	

other hand, simultaneous repair of the sacrum and trochanteric regions should be avoided since it precludes side or back lying position in the postoperative period.

Genitourinary problems may influence the planning of plastic surgery. The patient who requires genitourinary procedures, such as operative cystoscopy or transurethral resection, should not undergo sacral plastic repairs until the genitourinary surgery difficulties are corrected. Suprapubic cystostomies should be closed whenever possible before plastic repair of the back. The lithotomy position required in genitourinary surgery should be avoided during the postoperative period after sacral plastic repairs. Repair of the ischial decubiti in certain patients may be delayed until the general rehabilitation program does not require wheelchair activities for at least one month.

In general, the plastic surgeon cannot treat the decubiti of any paraplegic patient without a full knowledge of the entire medical, surgical and rehabilitation program for the individual patient. The complexity of medical and surgical problems which must be coordinated in a paraplegic patient is illustrated in Chart 1. This patient underwent a total rehabilitation program in a period of more than one year, during which time fourteen major surgical procedures were required. It is to be noted that planning between the physiatrist and the surgeons enabled the patient to carry out the physical rehabilitation program simultaneously with the medical and surgical treatment, thus saving many additional months of hospitalization. During this period, it also may be noted that the patient not only completed self care activities but also completed prevocational and educational objectives (chart 1).

Finally, the physiatrist and plastic surgeon should cooperate in the interim care of the paraplegic patient requiring multiple procedures. Upper extremity exercises can be continued in almost all patients immediately after operation. Training the patient in simple self-care activities such as turning from side to side in bed preoperatively may simplify postoperative nursing care. In many instances, where large sacral or ischial repairs are carried out, the patient may begin ambulation activities long before being allowed to sit in a wheelchair. A week or ten days following sacral or ischial repair, many patients can be allowed to ambulate with braces between

parallel bars. This is made possible by shifting the patient from the prone position on the litter to the erect position in parallel bars, carefully avoiding any sacral pressure, friction or strain over the operative areas. By carrying out ambulation before the patient is allowed to sit postoperatively, postoperative deconditioning may be prevented. In these cases the patient may not be permitted to sit in a wheelchair for a month or longer, but during all of this period ambulation activities can be continued. In early ambulation of paraplegic patients following plastic repair of ischial or sacral regions careful attention must be given to the adjustment of the ischial thigh cuff on the braces as well as the back brace to avoid irritation or pressure over the recent operative site.

Summary

Plastic surgery in the paraplegic patient, particularly in those patients requiring multiple surgical procedures, must be coordinated into the entire rehabilitation program. This requires close cooperation between the physiatrist and the plastic surgeon. The areas of overlapping clinical responsibility which can best be met by the combined efforts of both members of the rehabilitation team involve first, the design of skin flaps and grafts, carried out with accurate information concerning the rehabilitation goal and details of the bracing requirements for each individual patient; second, the timing of each surgical procedure, made with a knowledge of the overall rehabilitation program for each patient, and third, modification of the physical rehabilitation program between operative procedures, best carried out with the cooperation of the plastic surgeon, thus shortening the overall duration of hospitalization.

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Electrosurgery for the Treatment of Cutaneous Neoplasms

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In every human endeavor there is room for differences of opinion. This applies to medicine, and in recent years I have heard outright criticism of many physical agents used for the diagnosis and treatment of various diseases. The criticisms which have reached me were especially directed towards the use of electrosurgery. It has been alleged that electrosurgery is "messy surgery" and that it should not be used for the treatment of moles. This is the justification for presenting another paper on electrosurgery for the treatment of some benign and malignant neoplasms of the skin.

Before launching on the main thesis of my presentation, I should like to refute what I believe to be faulty criticism of electrosurgery. It is true that wounds following electrosurgical procedures require a longer healing time than do non-infected wounds produced with a sterile scalpel which heal by primary union. However, in treating lesions about the eyelids, ears and nose, the cosmetic result following electrosurgery is usually superior to that following scalpel surgery. Electrosurgical technic often obviates hospitalization and the increased expenditures for the use of the operating room and the anesthetist's fee. Some surgeons find high frequency currents very useful for the treatment of some cutaneous neoplasms.

No one should take seriously the statement that the use of electrosurgery for the treatment of a benign tumor causes it to become malignant. There is no scientific evidence to substantiate this allegation. If cancer does follow the treatment of an ordinary brown hairy or hairless mole present since birth, then it must be indeed a rare occurrence, especially when you consider that practically every person has one or more moles scattered over his body. I personally have never seen this transformation even though I have enjoyed a large private practice and have been connected with the largest skin clinics in the world for nearly twenty years.

I want to emphasize again that the transition of a mole to melanocarcinoma occurs rarely, if at all. When it is alleged that melanocarcinoma developed following improper treatment of a mole, the case has to be critically reviewed. It is more likely that an early primary melanocarcinoma or a metastatic melanocarcinoma was mistaken for a mole. The error is an easy one to make because the differential diagnosis between a malignant melanoma and a benign nevus is sometimes extremely difficult to determine both clinically and histologically. It is always well when there is a shadow of a doubt to excise suspicious lesions widely with a scalpel or a high frequency electrocutting current and submit them to histological examinations.

Success in treating cutaneous neoplasms with high frequency electrosurgical currents depends upon the proper selection of the current. All apparatus are not suitable for performing all electrosurgical functions. Therefore, for optimal results, adequate machines are to be employed. It is essential that the individual who does electrosurgery bear in mind the distinct effects to be obtained from the cutting, desiccating, and coagulating circuits. The cosmetic result and the thoroughness of cure of a treated lesion depend upon this knowledge. Of importance also is the proper use of a curet when performing electrosurgical procedures. It is superfluous to mention that a knowledge of the simple

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rudiments of surgery will prevent many pitfalls. A physician who does not know the nature of the disease should not attempt to perform electrosurgical operations simply because he has in his possession an apparatus designed for such procedures.

Most cutaneous neoplasms can be adequately and satisfactorily destroyed with the electrodesiccating current and curettage under procaine anesthesia. Some require the use of the electrocoagulating current, and a few of the more malignant neoplasms require the use of the electrocutting current. My own clinical experience indicates that a spark gap high frequency electrosurgical apparatus is to be preferred for the treatment of dermatologic disorders. When a physician undertakes the complete destruction of a lesion, he should employ anesthesia, except for the tiny lesions which require a very short exposure.

Many different cutaneous neoplasms, both benign and malignant, are amenable to treatment with electrosurgery. The following alphabetical list is probably incomplete: adenoma sebaceum, angioma, cutaneous horn, dermatofibrosarcoma protuberans, epitheliomas, fibroma, fibrosarcoma, granuloma pyogenicum, kaposi's sarcoma, keloid, keratoses, lipoma, melanoma, myoblastoma, nevi, rhinophyma, veruccae, xanthoma and xeroderma pigmentosum. To illustrate the method of treatment with high frequency currents, a few diseases will be discussed.

Adenoma Sebaceum

Adenoma sebaceum is only of cosmetic importance and it is therefore necessary in order to prevent scarring to treat the lesions with very mild instantaneous surface applications of the electrodesiccating current. It is best not to attempt to remove these lesions at one sitting but to give several treatments at long enough intervals to allow complete subsidence of reactions from the previous treatment.

Granuloma Pyogenicum

Granuloma pyogenicum is usually manifested as a round or oval vascular lesion resulting from a low grade pyogenic infection or from a foreign body. It resembles an angioma and sometimes it is to be differentiated from a melanoma. Electrodesiccation under procaine anesthesia offers the best method for the destruction of granuloma pyogenicum. The lesion is thoroughly desiccated from the surface, curetted and the base is then lightly electrodesiccated.

Rhinophyma

Rhinophyma is not usually included among the cutaneous neoplasms, but occasionally the proliferation of the sebaceous glands of the nose become so great as to give a lobulated appearance to the nose and in extreme cases the lobulation is so marked as to form a hanging tumorous mass from the tip of the nose. Such a mass becomes cosmetically disfiguring and mechanically interferes with ingestion of food and drink.

These large tumorous lesions can be pared away from the nose under local procaine anesthesia with the electrocutting current, leaving behind the cartilage of the nose and a sufficient supply of sebaceous glands from which new epithelium is to grow to cover the nose. The oozing from the smaller bleeding blood vessels can be stopped with the electrodesiccating current and the larger blood vessels have to be tied off with cat gut, fine silk or dermal suture material. It is well not to use a strong coagulating current because this might destroy too much of the cartilage or the remaining sebaceous glands, resulting in multiple perforations. After the operation, the area is covered with sterile petrolatum gauze dressings, which are changed daily. In about three weeks there is complete healing.

Verrucae

Different types of warts in various locations require different methods of treatment. The minute digitate and flat multiple warts appearing in the bearded region may be treated by the use of a fine spark from the Oudin resonator. Because of the smallness of the lesions, the fineness of the spark and the short-

ness of the exposure, anesthesia is not necessary. Verruca vulgaris having a diameter larger than 0.5 cm. and verruca plantaris should not be treated without anesthesia. After sterilizing the skin with iodine and alcohol, 2% procaine solution is injected beneath and around the wart; the lesion is then electrodesiccated and the dehydrated portion is removed with a sharp skin curet or cut away with sharp pointed scissors. The base of the lesion is then electrodesiccated. A general anesthetic of the non-explosive type is required when it is necessary to remove many lesions at one sitting. Condylomata acuminata appearing on the genitals of either the male or the female may be treated in the same way as verruca vulgaris under either local or general anesthesia. However these venereal warts respond very readily to topical applications of podophyllin.

Keratoses

Keratoses are of several types. Those that appear on the face and trunk in individuals with an oily skin and are characterized by their multiplicity and by their loosely adherent yellowish scales are called seborrheic keratoses. These are the most benign of all the keratoses. When these lesions eventuate into cancer, they are usually of the basal cell variety. The so-called senile keratoses, appearing on the backs of the hands and on the face of those advanced in age and in those individuals who are exposed to the elements, such as farmers and sailors, are more dangerous than the seborrheic type of keratoses. When these eventuate into a new growth they usually form squamous cell epitheliomas. Arsenical keratoses, which result from long continued ingestion of arsenic, also eventuate at times into squamous cell epitheliomas. It is therefore important, from the viewpoint of therapy, to know what type of keratosis one is treating. The senile and the arsenical keratoses require more radical treatment.

After procainizing the lesion, the hyperkeratosis is removed with a sharp curet. At the same time, one determines whether or not any malignant change has taken place. If no epitheliomatous nests are discovered, the surface is lightly electrodesiccated. If the lesion shows evidences of malignant changes, it is electrocoagulated for about 0.5 cm. beyond its limit, thoroughly curetted and the base heavily sparked with the desiccating current.

Nevi

A common mole which is raised, pigmented, and hairy is looked upon by many as a disfigurement. Patients in increasing numbers are seeking relief from this common condition. When using electrosurgery for the cosmetic improvement of this condition, one should employ the fractional method of treatment. Without procainization the surface of the lesion is sprayed with a fine Oudin spark. After the reaction from the treatment completely subsides, which is in the neighborhood of about 20 days, a second treatment is administered. Three such treatments are normally sufficient to reduce a mole to the level of the skin. If too heavy sparking is used there is the danger of obtaining a depressed scar and from a cosmetic viewpoint, this defect is as offending as the original mole. It is inadvisable to attempt to remove a benign mole in one treatment by the use of electrodesiccation, electrocoagulation or by the cutting current, because this always leads to scar formation. On covered portions of the body, it is well to destroy completely at one sitting under procaine anesthesia any mole which shows signs of growth or change of color. It is strongly advisable to have the nevus examined by a histopathologist for evidences of cancer or melanoma.

Basal Cell Epithelioma

There are three main types of skin cancer: the basal cell epithelioma, the squamous cell epithelioma, and the melanocarcinoma. Other cutaneous tumors seen less frequently are baso-squamous cell epithelioma, Paget's disease, Bowen's disease, sarcoma, tumors which metastasize to the skin, and the lymphoblas-

tomas. Each type of skin cancer is treated differently and the prognosis of each is different. Hence the importance of recognizing the various types. Basal cell carcinoma is the most common type.

The basal cell type of cancer appears mostly on the face and trunk of adults. They grow very slowly and cause no pain. The history which is usually elicited is that the first sign of any growth was the appearance of a small scaly area. The lesion extends gradually in size. As time passes on, the scab falls off leaving a small central depression which oozes and bleeds slightly until a new scab reforms. Then the process begins all over again in several weeks. With the falling of each scab, the central ulcerated area gets larger. In the meantime the periphery of the lesion assumes a rolled raised border with a waxy or translucent color. This development may take several months to several years. However, it must be emphasized that the lesion becomes progressively larger. A neglected growth may invade important underlying structures and cause extensive destruction of tissue, with death from exhaustion, infection or hemorrhage. It is doubtful that basal cell epitheliomas metastasize or originate in mucous membranes. They are radiosensitive, but are amenable to other methods of treatment.

There are many clinical varieties of basal cell epithelioma. Some of these varieties are the nodular, the papillary, the ulcerous, the deep, the flat, the cicatrizing, and the morphea-like types. All types have certain features in common, the outstanding ones being those showing the pearly or waxy border with telangiectasia and the tendency towards central ulceration with peripheral and deep extension.

What does one do about a basal cell epithelioma? These lesions grow slowly and do not metastasize and so a variety of methods of treatment are available. The choice of method depends upon the size and the location of the lesion, the clinical variety, and the state of health of the patient. The object is to destroy the lesion completely the first time it is treated and with as little deformity as possible. Radical removal with resulting gross mutilations is not necessary. A small early lesion may be excised under local anesthesia or with electrosurgery and curettage, especially if the lesion is situated on the nose, near the canthi or the eyelids.

The electrosurgical technic is simple. After procainizing the area, a portion of the lesion is removed with a scalpel for biopsy, then the whole involved area, including approximately 0.5 cm. beyond the visible or palpable margin, is electrodesiccated. This dehydrated tissue is then removed with a curet and the base is again electrodesiccated. One may excise with the electrocutting current the entire lesion, including a border of what appears to be clinically normal tissue. In one operation the tumor is removed and the specimen is preserved for histologic examination. The base is then curetted and electrodesiccated. In using electrosurgical currents for the treatment of cutaneous malignancies, one must not overlook the important role played by the proper use of the curet.

The cosmetic result following such procedures is usually excellent. Under certain circumstances chemical agents may be used to destroy carcinomatous tissue according to the methods of Sherwell or Mohs. Therapy with x-rays or radium is particularly desirable in patients who have systemic diseases or who are apprehensive and old and do not desire surgical procedures. All these methods yield excellent results if the cases are properly selected and the therapeutic procedure is carried out by an expert. Dry ice, caustics, partial removal using a galvanic current and all other half way measures are not to be employed for the treatment of any malignancy, no matter how minor it may appear to be. Removal of draining lymphatics is not a necessary procedure for the treatment of basal cell epitheliomas, nor is it necessary to irradiate the gland-bearing areas. Those who have not had actual personal experience should not attempt to treat cutaneous malignancies.

Squamous Cell Epithelioma

Squamous cell epithelioma, also called prickle cell epithelioma and epidermoid carcinoma, is a more serious lesion because if it is neglected or mistreated it may metastasize and ultimately cause death. Most squamous cell tumors begin on the mucous membranes. Those that originate on the skin are usually seen on the exposed parts of the body and arise from a previously existing lesion such as a scar from a burn, senile or an arsenical keratosis, radiodermatitis, leukoplakia, cutaneous horn, or xeroderma pigmentosum.

Primary cutaneous squamous cell epithelioma begins as a nodule or as a small, well-defined area of infiltration and may involve the scalp, ears, vulva and penis. Ulceration occurs early and the lesion is usually indurated. The margins of the ulcer may be waxy and may suggest a rolled border as in basal cell epithelioma. The ulceration may be proliferative and granulomatous or even vegetative. As a rule there is but a single lesion; occasionally there are multiple lesions. Its evolution may be rapid, but in old persons, in scar tissue, and in malignancies of low grade, the development is slow. Metastasis follows the same rule.

The treatment of a squamous cell carcinoma is more critical. Because it is potentially more malignant than a basal cell epithelioma, more radical procedures are justifiable. The primary lesion has to be totally destroyed the first time it is treated and if there is any suspicion that there might be node involvement, then adequate treatment of the draining lymphatics is indicated. There should be no delay whatsoever in instituting treatment once the diagnosis of a metastasizing epithelioma is made.

Single small lesions which are proliferating and which have not been present too long can be destroyed with electrosurgery using the technic described for the treatment of a basal cell epithelioma. Larger lesions which show evidence of possible metastasis require total excision of the primary lesion and radical node dissection. Older people who may be bad surgical risks because of age, systemic disease such as diabetes mellitus, or who are reluctant to have any surgical intervention can be treated with x-rays or radium. For the treatment of most squamous cell epitheliomas with or without metastases surgical procedures are preferred.

Melanocarcinoma

Melanocarcinoma is the most malignant of all skin tumors, but, fortunately, is among the least common. These tumors sometimes have their origin in moles which have been repeatedly irritated or which have been incompletely removed. The degree of malignancy may vary greatly in different individuals, according to one's age and to the location and type of the lesion in which the tumors originate. They usually cause the patient's death, but in children the prognosis is more favorable than in adults. Melanocarcinomas occur mainly in the white race and are more common in men.

Melanocarinomas often begin as pinhead or pea-sized black, brown, or bluish papules or nodules. They may resemble blue nevi, epidermal nevi, pigmented moles, and pigmented basal cell epithelioma. They may appear on any part of the body, but most often they are seen on the sole or some other part of the foot or around a fingernail. The lesion increases in size gradually and the pigment radiates in irregular fashion from the tumor. At this time, the regional glands may become enlarged or there may be a second tumor in the general vicinity of the first one. The tumors or pigmented areas spread gradually over all of the skin surface and invade the lymph nodes, the spleen, the liver, and the central nervous system. By the time this occurs, melanin is found in the urine and the prognosis becomes hopeless. The course of melanocarcinoma is variable; however it usually follows a rapid course once activity is initiated.

The pathologic diagnosis of tissue suspected to be melanotic is as difficult as is an exact clinical diagnosis. Sometimes able pathologists differ as to

whether sections show benign or malignant pigmented growth. Clinic and histologic findings have to be carefully correlated when the question of diagnosing a melanoma arises.

The treatment of melanomas requires judgment based on experience. An heroic extensive mutilating operation is not the answer to the problem of therapy of these malignant neoplasms. Sometimes it is more humane to let nature take its course. If there were a way of knowing whether a particular melanoma is destined to metastasize by way of the lymphatics or by way of the blood stream, then one could be more accurate in selecting the best form of therapy.

Small lesions suspected of being melanocarcinoma can be removed by wide and deep excision either with the scalpel or with electrosurgery. Sometimes the excision of lymph nodes is also necessary to bring about a cure. In other words, all melanocarcinomas should be treated radically. The superficial cauterization or electrodesiccation of lesions of melanocarcinoma is dangerous. In this instance also, radiation is of questionable and limited value. Some physicians suggest removal of the lymph nodes when the melanocarcinoma is excised. Melanocarcinoma is such a serious disease and the mortality rate is so high that in treating it a physician often is tempted to perform unnecessarily extensive operations. Good results following the treatment of melanoma are due to early diagnosis and thorough destruction, either by electrosurgery or by scalpel excision of the primary lesion before dissemination takes place. Perhaps the removal of all suspicious moles which are subjected to constant trauma is advisable as prophylaxis; but the removal should be done thoroughly by wide excision or by electrocutting.

Electrosurgery has been used for the treatment of dermatologic conditions for nearly thirty years. During these three decades, medicine and surgery have made tremendous progress. Nevertheless, electrosurgery is still one of the most important component parts of the armamentarium of the dermatologist. In fact, it is difficult to imagine how a dermatologic practice or a clinic can be conducted without electrosurgical equipment.

Summary

Electrosurgical currents are adequate, safe and efficient for the treatment of most benign and malignant tumors of the skin. Electrodesiccation is employed far more frequently than electrocutting or electrocoagulation and, therefore, a "spark gap" high frequency apparatus is more desirable than a "tube" machine. For the treatment of most neoplasms local procaine anesthesia is usually employed. The use of the curet is an essential part of the procedure of destroying cutaneous lesions with electrosurgery. Rudimentary rules of surgical procedures and of antisepsis must be employed for successful results. It is seldom necessary to hospitalize patients treated with electrosurgery.

The following tumors especially lend themselves to treatment with electrosurgery: adenoma sebaceum, angioma, cutaneous horn, dermatofibrosarcoma protuberans, epitheliomas, fibroma, fibrosarcoma, granuloma pyogenicum, Kaposi's sarcoma, keloid, keratoses, lipoma, melanoma, myoblastoma, nevi, rhinophyma, veruccae, xanthoma and xeroderma pigmentosum. Some of these tumors may also be treated with other methods. The detailed technic for the treatment of the more important tumors has been outlined.

Iontophoresis With Dye Substances, Inorganic Compounds and Organic Drugs*†

Experimental Studies

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and
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The introduction of drugs into the human body by means of electrical current has fascinated the medical profession for more than a century. According to Turrell[1], such a form of medication was described as long ago as 1747 by Veratti. Jones[2] stated that Palaprat claimed to have introduced iodine into the tissues in this way in 1833. Frankenhauser[3] in 1898 was very successful in introducing many drugs into the body by the use of galvanic current. The general application of the theory, as a practical exercise in therapeutics, must be credited to Leduc[4], who, in a series of papers beginning in 1900, brought it prominently before the medical profession.

Iontophoresis can be defined as a movement of ions into tissue by the action of electrical current. It is contrasted with electrophoresis, which is a movement of colloidal substances in the presence of an electrical charge. Within the past twenty years there have developed, in general, three schools of thought as to events taking place during iontophoresis, based respectively on the following theories: 1) Iontophoresis produces a purely local effect. Its penetration is not adequate enough to induce significant effects systematically — Harpuder[6], Gunderson[8], and Molitor[7]; 2) The substance used in iontophoresis moves in a "tissue plane." Its movement through the body of the subject is due to the electrical field set up between the two electrodes, and it follows this electrical plane more or less irrespective of biological barriers — Abramson[9], and Walzer and Golan[5], and 3) Iontophoresis produces a systemic or remote effect. This involves the penetration of the substance into the blood stream and its subsequent distribution to all parts of the body — Frey[10], Bourguignon[11], and Garb[12].

Because of this wide divergence of opinion regarding the effects of iontophoresis, and the striking absence of a controlled experimental appproach, it was decided to explore this subject extensively. With this in mind decision was made to use dye substances, several inorganic compounds and selected organic drugs for the investigation.

Methods

Adult male and female albino rats of the Sprague-Dawley strain were used in this study. The weight range of the animals used was between 150 and 300 grams. Pentobarbital anesthesia, thirty to fifty milligrams per kilogram, administered intraperitoneally, was used for all experiments.

The apparatus for iontophoresis consisted of two ninety volt batteries connected in series and with an ammeter and potentiometer for regulation of the current flow. A switch and the electrodes completed the circuit. This was used interchangeably with the Golseth Fizzell Constant Current Generator. The electrodes consisted of wire terminals bound around a piece of moistened cotton and attached to the body of the rat. For convenience, the "driving electrode," the electrode where the material to be introduced was placed, was attached to the front left foot of the rat. The "receiving electrode," the opposite pole, was attached to the middle of the tail of the

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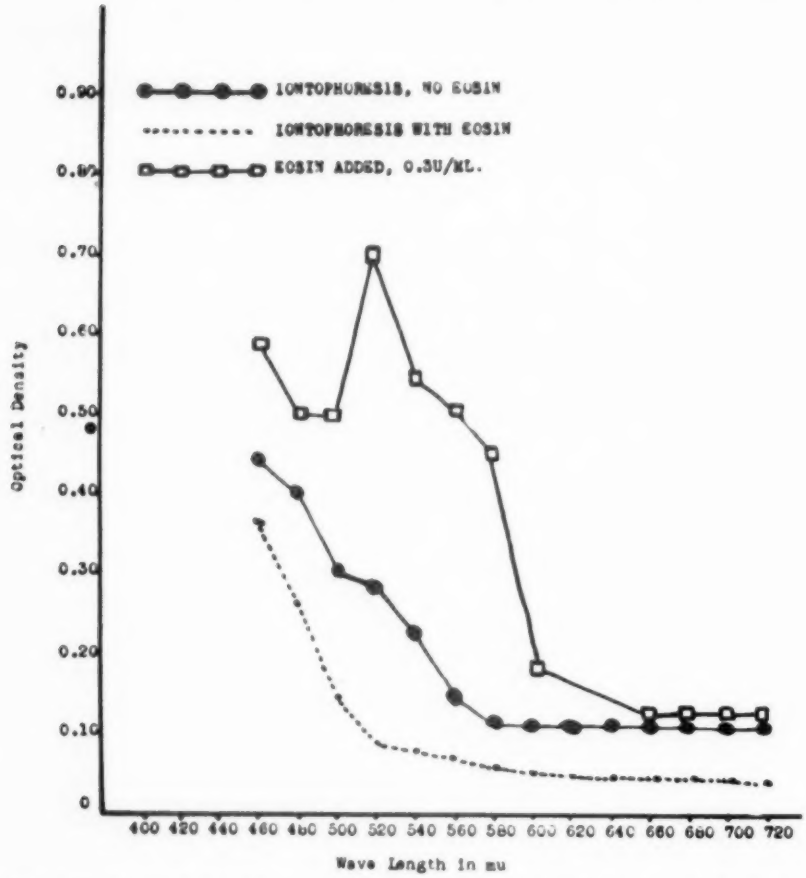


Fig. 1 — Spectrophotometric curves of rat urine with and without eosin. In the iontophoresis experiments composite urine from six rats was used.

animal, approximately twenty centimeters from the point of application of the "driving electrode." Five milliamperes of current for a duration of one hour was used for the application procedure.

Dye Substances Used

Two different dye substances were used, a basic dye, methylene blue and an acid dye, eosin. Fifteen milligrams of the dye, dissolved in three milliliters of distilled water, were applied to the "driving electrode." In the case of methylene blue, the "driving electrode" was the anode. In the case of eosin the "driving electrode" was the cathode. In all experiments, samples of blood plasma, urine and extracts from the "receiving electrode," taken at the conclusion of the experiments, were used in spectrophotometric examination for possible identification of the dyes. All animals were dissected, at autopsy after the experiment, to determine the extent to which visible distribution of the dye had been accomplished. Three such experiments were carried out with each dye.

The "receiving electrode" samples and the blood plasma samples in both series of experiments, were negative in spectrophotometric examination for the presence of the dye. In the case of eosin, the urine was also negative. This is shown in figure 1.

However, with the case of methylene blue, the spectrophotometric test indi-

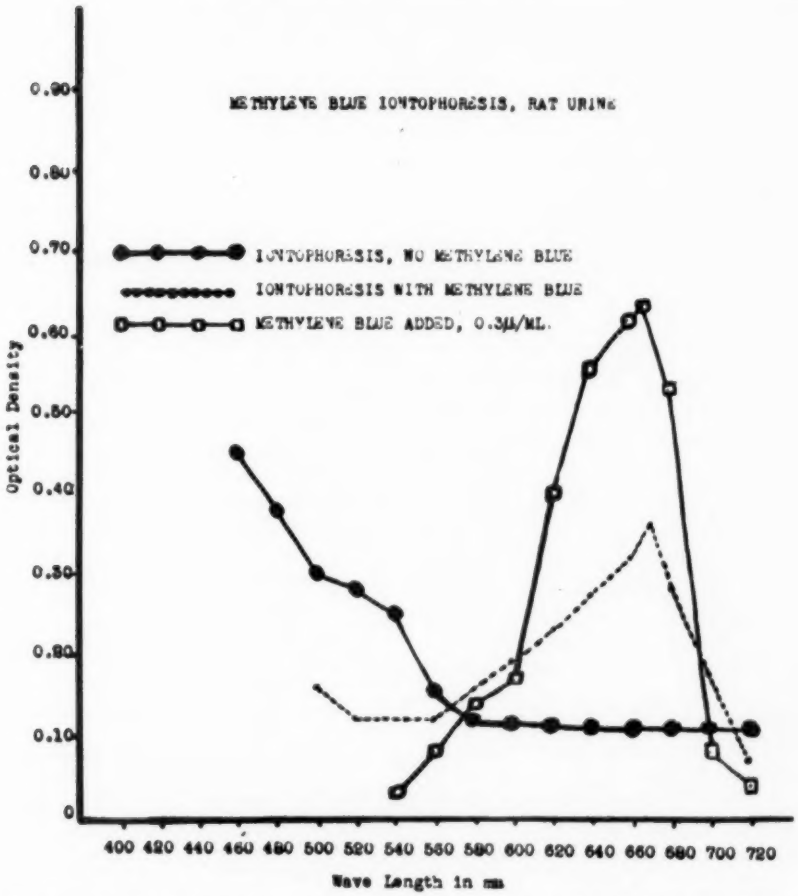


Fig. 2 — Spectrophotometric curves of rat urine with and without methylene blue. In the iontophoresis experiments composite urine from six rats was used.

cated the presence of methylene blue in the urine samples taken after the discontinuance of iontophoresis. Figure 2 illustrates these results.

Autopsy study revealed that methylene blue had penetrated the tissues in the region of the "driving electrode" to about a distance of one centimeter. In addition it had stained the underlying bone. Other tissues or areas gave no evidence of methylene blue staining (in particular the body area between the electrodes, and the area of the tail in the receiving electrode zone). In the case of eosin there was no extensive tissue staining even in the region of the "driving electrode." Here only a few millimeters of the underlying dermal tissue were stained. Similar experiments with dyes were performed, in which the poles of the electrical circuit were reversed. In these cases, the dye was therefore applied to the electrode which had the electrical sign opposite to that of the dye ion. In all of these instances no spectrophotometric evidence was obtained, indicating the presence of the dye in plasma, urine, or "receiving electrode" samples following iontophoresis. Autopsy examination did not reveal any extensive tissue staining by either methylene blue or eosin, under these conditions, in which the "driving electrode" was of an opposite charge from that of the ion under study.

Table 1 — Summary of results, after iontophoresis, of chemical tests for inorganic ions. (—) refers to negative results obtained using chemical test listed. Four animals were used with each chemical, all produced entirely negative results as shown.

	KI	$CuSO_4$	$HgCl_2$	$Na_2B_4O_7$
Selected electrode	cathode	anode	anode	cathode
Blood plasma	—	—	—	—
Urine	—	—	—	—
Receiving electrode	—	—	—	—
Chemical test	starch-iodine (14)	o-tolidine NH_4SCN (14)	$SnCl_2$ & aniline (14)	curcuma paper (14)
Sensitivity in plasma	5 ugms. per ml.	1.0 ugms. per ml.	5.0 ugms. per ml.	0.5 ugms. per drop

Inorganic Compounds Used

Experiments of a nature similar to those described in the use of dye substances were performed using several inorganic compounds. The collected samples were tested, after iontophoresis, by selected sensitive chemical tests. In this group of experiments, a total of twenty five milligrams of the individual inorganic compound, dissolved in five milliliters of distilled water, were applied at the "driving electrode." The substances which were used in this manner are listed in table 1. It is apparent from examination of this table that the chemical tests which were used did not detect any of the iodide, copper, mercury or borate which had been applied by iontophoresis, in samples from blood plasma, urine, or the "receiving electrode" area.

Organic Drugs Used

The procedure for this series of experiments was the same as that for the previous group, except that no samples for spectrophotometric or chemical tests were examined. Instead, a pharmacological, in vivo, test was used as an indication of the penetration and distribution of the drug. In all these experiments and with each compound, the appropriate (same electrical charge) "driving electrode" was used at first and then another group of rats was used in which the electrode, where the drug was applied, was of the opposite electrical polarity to the charge on the active organic ion. Finally, the entire procedure was repeated without any electrical current. That is, no iontophoresis was used, but the drug was allowed to remain in contact with the electrode and the skin of the rat, in the same manner as when iontophoresis was used. With each of the four drugs, it was also determined in a series of rats, under the same pentobarbital anesthesia, how much of the appropriate drug was required by subcutaneous injection to produce pharmacologic effects, in vivo, which were comparable to those pharmacological effects observed after iontophoresis. Each drug was applied to the electrode in four milliliters of aqueous solution. The drugs used, the total amount so applied, and the data from these experiments, are listed in table 2.

Tubocurarine chloride U.S.P. was also used in a series of six similar experiments, using in one case three rabbits and in another three rats. In these animals, the sciatic nerve was isolated and stimulated by electrical stimuli, approximately forty per minute, during one hour iontophoresis using 100 units of tubocurarine chloride. The resulting contractions of the gastrocnemius muscle were recorded on a smoked kymograph. Figure 3 is a representative record from such an experiment. It clearly shows the typical myoneural depression, as a result of systemic distribution of tubocurarine chloride, and the subsequent recovery of the normal pattern.

Discussion

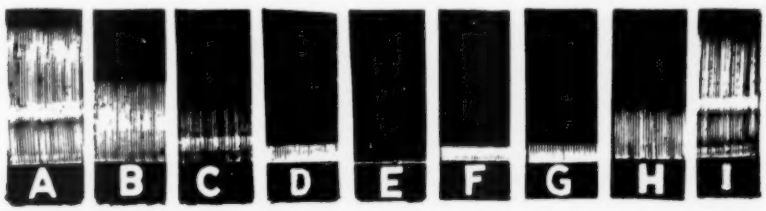
Methylene blue dye, used in iontophoresis produced some systemic distribution. The presence of the dye in the urine after use of this agent indicates this. Such a finding is definite evidence of a "systemic effect." Methylene blue

Table 2 — Summary of pharmacological results obtained after iontophoresis with organic drugs. Four animals were used for each drug, and similar results were obtained in all.

Drug	Total mgms. applied	Selected electrode	Response	Similar response from subcutaneous injection, in mgms. per rat
Strychnine sulfate	9.0	anode	Tetanic convulsions	2.0
Picrotoxin	12.0	anode	Tonic-clonic convulsions	2.4
Nicotine sulfate	270.0	anode	Fibrillary twitchings of the skeletal muscles, slight generalized convulsions and rapid heart rate	60.0
d-Tubocurarine chloride	15.0	anode	Severe respiratory depression, increased threshold for stimulation of the sciatic nerve and later failure of muscle contraction	2.3

was not detected in blood plasma in these experiments. This substance may have been present in concentrations that were too small to be detected by the methods used.

Two cations—copper and mercury, two anions—iodide and borate, could not be detected by chemical means in plasma, urine or "receiving electrode" areas after iontophoresis. This was true even though rather sensitive chemical tests were selected for use in the endeavor to detect them. Eosin, a negatively charged dye, also did not appear to be present in either blood plasma, urine, or "receiving electrode" areas. In the case of the organic drugs which were used—strychnine, tubocurarine



IONTOPHORESIS WITH D- TUBOCURARINE IN RABBIT

Maximum galvanic shocks, 40 per min. to exposed sciatic nerve; gastrocnemius muscle responses recorded.

A- Before iontophoresis. Iontophoresis begun.
B- 15 min.
C- 30 min.
D- 45 min.
E- 60 min. Stop iontophoresis.
F- 75 min.
G- 90 min.
H- 105 min.
I- 120 min.

Fig. 3

chloride, picrotoxin and nicotine—all four of these substances produced clear cut pharmacodynamic evidence of their systemic distribution.

Gordon and Darling[12] observed that the threshold values, to electrical stimulation of a suitable nerve muscle preparation, were not altered after iontophoresis with tubocurarine chloride. Therefore they believed penetration was limited. They used six rabbits in their experimental work.

The results reported here in regard to tubocurarine chloride are in contrast with those of Gordon and Darling. In our experiments the threshold values for electrical stimulation of the nerve muscle preparation of the rat and the rabbit were markedly increased and finally abolished during iontophoresis with tubocurarine chloride (fig. 3). In addition depression of respiration and death ensued in some cases. This is a demonstration of the systemic action of tubocurarine chloride introduced by iontophoresis.

Positive results were obtained when the electrode at the site of application of the chemical was of the same polarity as the electrical charge of the substance under iontophoresis. Similarly in all cases, the experiments invariably resulted in negative results, when the inappropriate electrode was used at the site of application of the substance, that is, when the "driving electrode" was of opposite electrical polarity to that of the ionic charge of the substance under examination.

Certain evidence of general or systemic effects was obtained, especially with organic drugs and one dye substance which were used. From these results one would say, in general, that local effects seem bound to occur. One can hardly envision indications of systemic effects without simultaneous production of local area effects. In general, then, the results lend substantial support to the thesis that iontophoresis produces a systemic result, as well as a specific local effect. There was no evidence that any "tissue plane" phenomenon was produced, although such an additional effect is not absolutely ruled out by these experiments. The negative results in tests for specific chemical substances, at the receiving electrodes, would tend to deny such an effect but not completely negate it. It is anticipated that experiments, designed to use radioactive materials, will give more information on this point.

It is believed that the appropriate ion is transported into the tissues, especially those below the skin, then taken up by way of the circulation and distributed systemically. This result is quite similar to that seen or obtained following subcutaneous injection by hypodermic needle.

Summary

Iontophoresis studies in the rat, using five milliamperes of current for one hour, are described. Positive evidence of penetration and distribution in the body were obtained using methylene blue, strychnine, tubocurarine chloride, picrotoxin and nicotine. No evidence for such penetration and distribution was obtained using eosin, potassium iodide, sodium borate, copper sulfate and mercuric chloride.

The effects obtained with iontophoresis are compared to those obtained following subcutaneous injection. The appropriate electrode polarity appears to be essential for successful iontophoresis: that is, the electrode at which the active chemical ion is applied must be of the same electrical sign as the charge of that ion.

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SCAPULAR FIXATION BY BRACING IN SERRATUS ANTERIOR PALSY

Report of Its Use in a Case of Serum Neuritis and Brief Review of the Syndrome

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The range of motion, stability and strength of the arm as a lever depends in large measure upon the co-ordinated function of the scapula and its integral musculature. Since the range of motion at the gleno-humeral joint is less than 180 degrees, the scapula must rotate in rhythmic relationship to the humerus when the latter is elevated above the head. The serratus anterior muscle is an important part of the mechanism which ensures controlled scapular rotation.

The digitations of the serratus anterior muscle arising from the first, second and third ribs, inserting predominantly on the vertebral border of the scapula at its superior angle, draw the scapula forward, increasing the reach and placing the arm elevators arising from it in a mechanically efficient position. The digitations arising from the fourth to the eight ribs converge on the inferior angle of the vertebral border. These rotate the inferior angle laterally, drawing the scapula forward and stabilizing it when the arm is raised in front of the body. In conjunction with the rhomboids, the serratus anterior holds the scapula against the thoracic wall. If either or both are paralyzed, the lower angle of the scapula projects as a "winged scapula." The rhomboids otherwise oppose the action of the serratus anterior.

Paralysis of the serratus anterior results in difficulty or inability to raise the arm above the head, unless the trapezius and rhomboids can be adapted to the extra strain imposed upon them. It also

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weakens scapulo-humeral rhythm, since the rhomboids alone must hold the vertebral border of the scapula against the chest wall. In many cases complete restoration of function and preservation of shoulder girdle stability can be achieved by means of specific therapeutic exercises. Such an achievement is not possible, however, if the other muscles responsible for stabilizing the scapula are involved in the distribution of the paralysis. Such cases, as well as those in which there is an isolated paralysis of the serratus anterior and in which adequate function cannot be restored, are usually considered as severely and permanently disabled. The disability is the result of an instability of the scapula due to adduction by the unopposed rhomboids or a weak trapezius restricting elevation of the arm in front of the body. Mechanical inefficiency of the muscles acting on the humerus within the remaining range of motion usually follows.

Part of the lost function can be compensated for, however, by mechanical stabilization of the scapula. Although many methods have been used successfully in individual patients, bracing of the scapula is considered difficult. Surgical procedures have not afforded uniformly good results. In recent years we have utilized a relatively simple scapular brace in a small number of cases of serratus anterior paralysis. Because of the marked improvement in function provided by this brace, even in the presence of extensive shoulder girdle paralysis, the case history of a patient with an extensive cervical neuropathy and the details of the brace were considered worth reporting.

Case No. 4772: A white man, thirty-two years of age, was initially seen in the Out-Patient Department of the Institute of Physical Medicine and Rehabilitation on January 16, 1951, with the chief complaint of marked impairment in functional abilities involving the upper extremities. The disability was attributable to serum neuritis following prophylactic injection of tetanus antitoxin six months before.

The functional motor elements specifically impaired were the arm-trunk mechanism on the right based upon the weak rhomboids and the completely absent serratus anterior. The initiation of abduction in the right shoulder was very awkwardly substituted for by externally rotating the arm and using the anterior deltoid and the long head of the biceps, which could not substitute for the supraspinatus. The motion could not be sustained for lack of proper fixation of the scapula. On manual fixation of the scapula by the examiner and suport at the elbow as a substitute for the supraspinatus, all of the movements could be carried out by the patient. To a lesser degree, a similar pattern of functional disturbance existed on the left side.

The clinical features of this case were quite characteristic of the relatively uncommon complication, serum neuritis. Stoldt[1] in a review of the literature reported 180 cases of neuritis after the use of tetanus antitoxin, diphtheria antitoxin, streptococcus antitoxin, pneumococcus antitoxin, scarlet fever streptococcus antitoxin, staphylococcus aureus vaccine and typhoid and paratyphoid vaccines. Doyle[2] lists many of these, but also includes antimeningococcus serum. Winkleman[3] has described it as following smallpox vaccination. Most of the reported cases, however, have occurred following the use of tetanus antitoxin.[4,5] Of forty-two cases reviewed by Allen[5], twenty-six were due to tetanus antitoxin. The complication is now considered by most observers to be an allergic manifestation, possibly due to a perineural edema producing a compression neuropathy.

The clinical picture, as reported, is fairly characteristic.[4,6] There are two groups: (a) in the vast majority of cases the paralysis comes on with severe con-

TABLE I—ELECTROMYOGRAPHY

Muscle	Rest	Slight Effort	Maximum Effort
Left:			
Upper Trapezius	Unable to relax	Diphasic Potentials	Interference
Supraspinatus	Fibrillations	0	0
Deltoid	Fibrillations	Complex Potentials	Interference
Triceps	0	Diphasic Potentials	Interference
Right:			
Upper Trapezius	0	Diphasic Potentials	Interference
Rhomboid Major	0	0	0
Rhomboid Minor	0	0	0
Supraspinatus	0	0	0
Serratus Anterior	0	0	0
Deltoid	0	Diphasic Potentials Triphasic Potentials	Interference
Triceps	Fibrillations	Diphasic Potentials	Isolated Potential
Thenar Eminence	0	Diphasic Potentials	Interference

stitutional symptoms of urticaria or serum sickness, and (b) in a much smaller group, allergic constitutional disturbances are absent. From three to ten days after the injection of serum, the general symptoms of serum sickness usually appear. Within a few hours to a few days after the onset of symptoms, extremely severe radicular pain usually occurs in the region of the shoulder and this is followed within several hours to two weeks by weakness of the affected part. Local muscular atrophy gradually becomes apparent. The commonest site of the flaccid paralysis and atrophy which occurs is in the shoulder. The muscles most frequently involved are the deltoid, supraspinatus, infraspinatus, serratus anterior and trapezius, although the triceps, biceps, pectoral, and even the muscles of the forearm, hand, leg and foot, may be included. Those innervated through the fifth and sixth cervical segments comprise the largest percentage reported. There is usually gradual improvement over a period of four to six months. The paralysis seems to bear no relationship to the nature of the serum or the site of the injection.

TABLE 2—CHRONAXIE

Muscle	Left	Right
Anterior deltoid	3.0	0.13
Coracobrachialis	0.4	0.13
Biceps	0.2	0.06
Brachialis	0.3	0.2
Pectoralis Major	0.08	0.07
Serratus Anterior	—	—
Supraspinatus	0.3	
Infraspinatus	—	—
Rhomboid Major	—	—
Rhomboid Minor	0.07	—
Latissimus dorsi	0.08	0.08

Time in Sigma

Diagnostic electrical studies, including chronaxie measurements and electromyography were performed (tables 1 and 2). These presented evidence of a loss of innervation of the scapular fixating muscles with more marked involvement on the right side. There was some electrical evidence of re-innervation in the left deltoid. It was recommended that the patient obtain a special scapular brace (fig. 1 and 2).

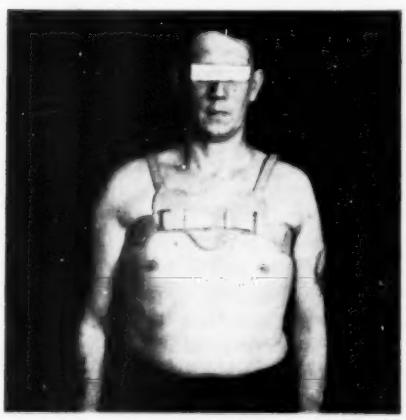

Fig. 1—Anterior view of the patient with brace in position.

In the six months prior to our initial examination, he was under intensive treatment with parenteral thiamine hydrochloride, sedation, calcium gluconate, Priscoline hydrochloride (tolazoline hydrochloride), whirlpool baths, galvanic stimulation, massage, active and passive exercises. Slight improvement occurred on the left, but the status of the right shoulder girdle remained unchanged.

No further treatment wis given, but the patient was reexamined monthly until October 1951, when he reported that the special scapular support had become increasingly more useful and that he had developed a degree of security and function which

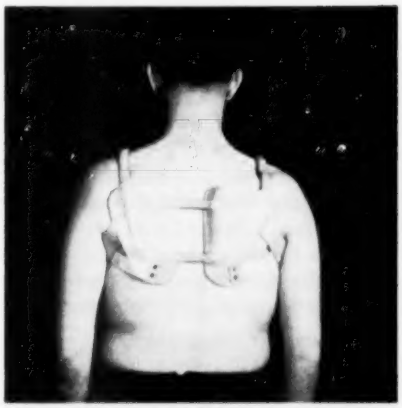

Fig. 2—Posterior view of the patient with brace in position. Note the turned-in veretebral border on the right side.

could hardly be approached without the aid of this device. It was now possible for him to elevate the right upper extremity completely above the head at a straight angle, and he had considerable functional range of motion in both arms to the extent that he now had an excellent working capacity.

The brace which was prescribed for this patient consisted essentially of bilaterally placed scapular plates with a turned-in vertebral border on the involved side, joined by rigid crossbars. Rigid, fitted brackets connect to a breast plate anteriorly. If winging is not completely controlled a crossed strap waistband, originating at the inferior angles of the scapular plates, can be added. A unilateral plate does not function as well as do bilateral plates. In addition, the latter type is more comfortable to the patient, and it is recommended that this

device be utilized even if the disability is unilateral. This brace is relatively inexpensive, can be constructed in any brace shop; it causes little discomfort. A very important feature to be noted is that the brace itself does not restrict shoulder movement. When the patient is wearing the brace and the arm is elevated, (fig. 3), the scapular plate assumes the proper position of the scapula at changing levels of arm elevation and holds the scapula in that position.

Fig. 3—Posterior view of patient with elevated arm. Note shift in position of the brace.

Summary

The functional significance of the serratus anterior muscle in the production of scapular stability is reviewed. A case of serum neuritis in which this muscle was paralyzed is presented. A simple brace was designed to fix properly the scapula to the thoracic cage, markedly increasing the patient's functional capabilities. The details of the brace are given and the syndrome of serum neuritis is briefly reviewed.

References

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2. Doyle, J. B.: Neurological Complications of Serum Sickness. Am. J. M. Sc. 185:484 (Apr.) 1933.
3. Winkelman, N. S., Jr.: Peripheral Nerve and Root Disturbances Following Vaccination Against Smallpox. Arch. Neurol. & Psychiat. 62:421 (Oct.) 1949.
4. Woolling, K. R., and Rushton, J. G.: Serum Neuritis. Arch. Neurol. & Psychiat. 64:568 (Oct.) 1950.
5. Allen, I. M.: The Neurological Complications of Serum Treatment. Lancet. 2:1128 (July) 1931.
6. Feiling, A. (Editor): Modern Trends in Neurology, New York, Paul B. Hoeber, Inc., 1951, p. 208.

Discussion

Dr. O. F. von Werssowetz (Nashville, Tenn.): In an isolated paralysis of the serratus anterior muscle, it is difficult to fix the scapula by bracing. This difficulty is partly due to the intricate mechanism of the shoulder joint, which is composed of four separate articulations. During movement, these are interdependent on one another, and any limitation in one will be reflected in the activities of the others. If the scapulo-thoracic articulation, which is activated primarily by the serratus anterior muscle, is eliminated from partaking in the shoulder motion, then the upper extremity is able to perform forward flexion to approximately 100 degrees. If the serratus anterior is paralyzed, then it produces a rotation of the scapula on its superior lateral angle, and the well-known picture of "winged scapula" occurs. The result of this is a marked decrease in stabilization, a downward drag of the shoulder, and an excessive activity of the antagonist muscles, particularly the biceps and coracobrachialis.

It is, therefore, obvious that to support effectively such a shoulder, (1) the scapula has to be derotated; (2) the influence of the weight of the extremity has to be eliminated, and (3) the action of the antagonists has to be prevented.

In the acute stage of serratus paralysis, the emphasis is placed on protecting the muscle, and the appliance used should be such as to prevent stretching and provide relaxation. These are provided for in a brace described by Horwitz and Tocantins,[5] which, in addition, derotates the scapula and eliminates the weight of the upper extremity. There are many other appliances devised for treatment of acute paralysis of this muscle, such as the MacKenzie[6] sling, Foucar's[1] "cloverleaf sling," Fitchet's[2] aeroplane splint, and others; but these appliances, as a

general rule, do not derotate the scapula effectively.

In a brace for treatment of permanent paralysis of the serratus anterior muscle, the emphasis should be placed on combining maximum stability of the shoulder with maximal mobility of the arm. The brace has to derotate the scapula and replace it in its normal position on the thorax so that the remaining muscles can exert the pull along their normal axes and, in this way, maintain the muscular balance as normal as possible. The brace has to allow complete and free use of the arm. Thomson and Miles,[7] have devised a direct pressure pad over the scapula, and Hohman[3] used a kidney-shaped pad over the interior border, but both of these did not derotate the scapula successfully. Hansson[4] used a molded leather brace reinforced with spring steel, which was very efficient, though slightly limiting the free use of the arm. Wolf[8] devised a brace consisting of a metal pad over the protruding scapula and so molded that the vertebral border was received into it. A similar metal pad was placed over the unaffected scapula. Both metal pads were connected by three steel springs, the lowest one extending around the axilla to be anchored in the infraclavicular fossa, for counter-pressure. This brace compressed the scapula to the thoracic wall and limited only slightly the movement of the arm. The brace described by the authors in this presentation seems to be a modification of Wolf's brace, and appears to be an efficient appliance for fixing the scapula in a paralyzed serratus anterior muscle. However, it is unfortunate that the authors selected and reported a case in which there occurred a generalized muscular involvement of shoulders and arms on both sides, and as it appears from this presentation, the brace was used to support this generalized weakness rather than the paralyzed serratus anterior alone. Therefore, no definite conclusion can be drawn as to the value of the brace in fixing the scapula following paralysis of the serratus anterior.

In general, the authors of this paper presented a very interesting report on serum neuritis, dwelling in detail on the etiology, symptomatology, and treatment, in which the fixation of the scapula by bracing had a minor, secondary, and an ambiguous role, especially in an affliction where spontaneous recovery is a rule.

References

1. Fitchet, S. M.: Injury of the Serratus Magnus. New England J. Med. 203:818, 1930.
2. Foucar, H. O.: The Clover-Leaf Sling. Brit. M. J. 2:865, 1933.
3. Hohman, G.: Orthopaedische Apparate und Bandagen. Aus Klinik und Wehrstatt, Stuttgart, F. Enke, 1938.
4. Hansson, K. G.: Serratus Magnus Paralysis. Arch. Phys. Med. 29:156, 1948.
5. Horwitz, M. T., and Tocantins, L. M.: Isolated Paralysis of the Serratus Anterior. J. Bone & Joint Surg. 20:720, 1938.
6. MacKenzie, Colin: The Action of Muscles, New York, Paul B. Hoeber, Inc., 1930.
7. Thomson, Alexis, and Miles, A.: Manual of Surgery, London and Edinburgh, Henry Frowda, 1912, vol. 2, p. 881.
8. Wolf, Josef: The Conservative Treatment of Serratus Palsy. J. Bone & Joint Surg. 23:959, 1941.

AWARDS OF MERIT
FOR THE YEAR 1953

George G. Deaver

Henry H. Kessler

The Committee on Gold Key Awards announced through its Chairman, Dr. William D. Paul, the following recipients:

GEORGE G. DEAVER, M.D., New York City, Physician, Educator and Humanitarian: Medical Director, Institute for Crippled Children; Professor of Physical Medicine and Rehabilitation at New York University; Associate Instructor of Physical Medicine and Rehabilitation at Bellevue Medical Center; Medical Director of the Training School for Physical and Occupational Therapy Training at New York University; Director of Physical Medicine Services at Lenox Hill Hospital: Who set up training courses in rehabilitation at the Institute for Crippled Children; trained the bulk of the early medical workers for the Air Force Reconditioning Services; was one of the pioneer workers and supporters of such groups as the Association for Aid of Crippled Children, National Society for Crippled Children and Adults, Academy of Cerebral Palsy, National Foundation for Infantile Paralysis, Inc.; who, by his tireless efforts in the rehabilitation of the disabled has notably advanced the Science and the Art of Physical Medicine and Rehabilitation.

HENRY H. KESSLER, M.D., West Orange, N.J., Internationally Renowned Surgeon and Author: Head of the Kessler Institute for Rehabilitation and President of the International Society for the Welfare of Crippled: Who was one of the first surgeons to appreciate and recommend supportive physical medicine and reconstructive surgery; is the originator of many ingenious operations and prosthetic devices for correction or substitution of physical losses due to injury or hereditary absence of limbs; who, by his many accomplishments has notably advanced the Science and the Art of Physical Medicine and Rehabilitation.

Awards to Scientific Exhibitors

The Committee on Awards for Scientific Exhibits presented through its Chairman, Dr. Ben L. Boynton, the following:

Gold Medal to Charles J. Imig, Ph.D., Duane Sutfin, M.S., and Harry M. Hines, Ph.D., for the exhibit "Plethysmography As a Method of Measuring Blood Flow." The exhibit demonstrated a precise and practical form of this tool for quantitating peripheral blood flow in response to various stimuli.

Silver Medal to Arthur A. Rodriquez, M.D., and Joseph Koczur, M.D., for the exhibit on "Physical Medicine and Rehabilitation at the Chicago Welfare Department Convalescent Home". This exhibit displayed a unique municipal welfare service in the area of total rehabilitation and clearly defined the practical gains which are achieved by this service.

Bronze Medal to Otto Eisert, M.D., and Owen Tester, R.P.T., for the exhibit on "Dynamic Exercises for Lower Extremity Amputees". This exhibit clearly demonstrated the technique of achieving integrated function of the lower extremity amputee into the achievement of independent ambulation.

Honorable Mention to Howard A. Carter, M.E.; Ralph E. De Forest, M.D., and Frederic T. Jung, M.D., for the exhibit on "Physics in Medicine". This exhibit presented in a clear and simple manner, the operation of a highly technical device.

IMPORTANT ANNOUNCEMENT

AMERICAN BOARD OF PHYSICAL MEDICINE AND REHABILITATION

The next examinations for the American Board of Physical Medicine and Rehabilitation will be held in Washington, D.C., September 5 and 6, 1954. The final date for filing applications in March 31, 1954. Applications for eligibility to the examinations should be mailed to the Secretary, Dr. Earl C. Elkins, 30 N. Michigan Ave., Chicago 2, Ill.

ANNUAL ESSAY AWARD . . .

Papers submitted for this award have been reviewed and it is the decision of the Committee that no award be made for 1953.

Committee on Prize Lecture
William D. Paul, Chairman
Frederic T. Jung
Allen Russek
Arthur L. Watkins

MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION OFFICERS 1954

William B. Snow, New York City, President.

William D. Paul, Iowa City, Iowa, President-Elect.

Howard A. Rusk, New York City, First Vice-President.

Gordon M. Martin, Rochester, Minn., Second Vice-President.

A. B. C. Knudson, Washington, D. C., Third Vice-President.

Donald L. Rose, Kansas City, Kan., Fourth Vice-President.

Arthur C. Jones, Portland, Ore., Fifth Vice-President.

Frances Baker, San Mateo, Calif., Secretary.

Frank H. Krusen, Rochester, Minn., Treasurer.

Walter J. Zeiter, Cleveland, Ohio, Executive Director.

Dorothea C. Augustin, Chicago, Executive Secretary.

Walter M. Solomon, Cleveland, Ohio, was elected to succeed himself to serve a term of six years on the Editorial Board of the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION. Dr. Solomon was also re-elected Chairman of the Editorial Board.

Walter J. Zeiter, Cleveland, Ohio, was re-elected to the American Board of Physical Medicine and Rehabilitation for a six year term as a representative of the American Congress of Physical Medicine and Rehabilitation.

Louis B. Newman, Chicago, was elected to serve a three year term on the Finance Committee.

Arthur L. Watkins, Boston, was re-elected to serve a term of seven years on the Board of the American Registry of Physical Therapists, beginning January 1, 1954. **Donald L. Rose**, Kansas City, Kan., was appointed to serve the unexpired portion of Dr. William Bierman's term of service on the Registry Board. Dr. Bierman resigned as Chairman of the Registry Board at its annual meeting on September 1, 1953. **Earl C. Elkins**, Rochester, Minn., was elected Chairman of the Registry Board with **Robert L. Bennett**, Warm Springs, Ga., acting as Vice-Chairman.

NEW CONGRESS MEMBERS

The following were elected to membership in the American Congress of Physical Medicine and Rehabilitation at the recent meeting in Chicago:

Aguilera, Miguel A., Callejon Maravillas 2-65, Guatemala City, Guatemala, C. A.

Amos, James D., Madigan Army Hospital, Ft. Lewis, Wash.

Anghinah, Abrao, Rua Almirante Barroso, 18, Sao Paulo, Brazil, S. A.

Bard, Gregory, U. S. Army Hospital, Camp Atterbury, Ind.

Beatty, Ralph R., 5001 E. 41st St., Kansas City, Mo.

Berns, S. Harry, 400 E. 34th St., New York 16, N.Y.

Brown, Joseph E., 10515 Carnegie Ave., Cleveland 6, Ohio.

Burney, Thomas E., 15644 Madison, Lakewood 7, Ohio.

Byrnes, Allen W., VA Hospital, Downey, Ill.

Dowdell, William F., 5854 Ridge Rd., Parma 29, Ohio.

Duncan, Wallace S., 10300 Carnegie Ave., Cleveland 6, Ohio.

Eising, Lucile, 1594 11th Ave., San Francisco 22, Calif.

Elger, Harold E., 820 E. 10th St., Vancouver, Wash.

Englund, De Witt W., The Orthopedic Clinic, 1313 N. Second St., Phoenix, Ariz.

Fountain, Freeman P., 781 Troy St., Denver 8, Colo.

Frankel, Victor H., U. S. Army Hospital, Ft. Bragg, N. C.

Furey, Charles A. Jr., 2201 St. James St., Philadelphia 3, Pa.

Gaenge, William G., 3100 Markbreit Ave., Cincinnati 9, Ohio.

Gauger, Adeline B., Pacific Colony, Spadra, Calif.

Gillmor, Charles S., 1226 Rialto Bldg., Kansas City 6, Mo.

Glasser, Otto, 2289 Chatfield Dr., Cleveland 6, Ohio.

Gordon, Edward E., 400 First Ave., New York 10, N. Y.

Grant, Arthur E., Capt., MC, U.S.A., Box 43, Letterman Army Hospital, San Francisco, Calif.

Greene, Lee B., 215 W. 75th St., New York 23, N. Y.

Hinojosa, Rolando A., American Hotel, American Colony, Nueva Rosita, Mex.

Hoerner, Earl F., 114 Crescent Ave., Louisville 6, Ky.

Jones, Robcliff V. Jr., 1415 Damon Ct., Rochester, Minn.

Katzenmeyer, Walter R., 380 Dover Rd., Bay Village, Ohio.

Leavitt, Lewis A., 3014 Shenandoah, Houston 21, Texas.

Long, Charles H. 1128 70th, Philadelphia 26, Pa.

Lorentz, John J., Physical Medicine Serv., U. S. A. Hospital, Ft. Belvoir, Va.

Miller, Robert V. Jr., Chief, Physical Medicine and Rehabilitation, VA Hospital, Los Angeles 25, Calif.

Moldaver, Joseph, The Neurological Institute, 700 W. 168th St., New York 32, N.Y.

Pedicini, Joseph L., 731 S. Center St., Orange, N.J.

Pessolano, Louis C., 309 Azure Way, Miami Springs, Fla.

Pike, Maynard A., 2032 Seymour Ave., Cincinnati 37, Ohio.

Policoff, Leonard D., 4406 Cary St. Rd., Richmond 21, Va.

Powers, Harry J., Chief, Physical Medicine and Rehabilitation, Veterans Hospital, Whipple, Ariz.

Rapp, Val W., Chief, Physical Medicine and Rehabilitation, VA Hospital, Tomah, Wis.

Rosner, Henry, 4824 Ave. I, Brooklyn 34, N.Y.

Schnur, Howard L., 5610 H. M. C., Houston, Texas.

Shafer, James A., 227 Arballo Dr., San Francisco 27, Calif.

Siegel, David, 404 Broadway, Cedarhurst, N.Y.

Silver, Joseph M., 24 Prichard St., Fitchburg, Mass.

Smith, Erma A., VA Hospital, Hines, Ill.

Stafford, Clyde T., 15 S. Main St., Oxford, Ohio.

Thomas, Joseph W., Physical Medicine Dept., Walter Reed Army Hospital, Washington 12, D. C.

Vultee, Frederick E. Jr., Walter Reed Army Hospital, Washington 12, D. C.

Wasserman, Reuben R., 2754 W. Rascher Ave., Chicago 25, Ill.

Wolpaw, Ralph, 2010 E. 102nd St., Cleveland 6, Ohio.

NEW SOCIETY MEMBERS

The following were elected to membership in the American Society of Physical Medicine and Rehabilitation at the meeting in Chicago, August 31, 1953:

Buchanan, Josephine J., 2873 S. Buchanan St., Arlington, Va.

Cohen, Lewis, 1404 David Broderick Tower, Detroit 26, Mich.

Davia, James E., 2022 S. 12th Ave., Maywood, Ill.

Di Paula, Frank R., Veterans Hospital, 7273 Canal Blvd., New Orleans, La.

Flax, Herman J., Professional Bldg. 206, Santurce, Puerto Rico.

Goldberg, Melvin C., 340 New York Ave., Brooklyn 13, N.Y.

Kent, Herbert, Capt., 3750th Med. Group, ARTC, USAF, Sheppard AFB, Wichita Falls, Texas.

Krusen, Edward M., 3500 Colgate, Dallas 5, Texas.

Leden, Ursula M., 3500 Colgate, Dallas 5, Texas.

Mahoney, Florence I., Physical Medicine and Rehabilitation Serv., Kennedy VA Hospital, Memphis 15, Tenn.

Moskowitz, Eugene, 220 N. Columbus Ave., Mt. Vernon, N.Y.

Schaeffer, Joseph N., Lt. Col., 3555th Medical Group, Perrin AFB, Texas.

Syracuse, Joseph A., 359 W. Ferry St., Buffalo 13, N.Y.

SEMINAR ON PHYSICAL MEDICINE AND REHABILITATION

A combined meeting of the Pennsylvania Academy of Physical Medicine and Rehabilitation and the New Jersey Society of Physical Medicine is scheduled for Saturday, October 17, 1953, Sacred Heart Hospital, Fourth and Chew Streets, Allentown, Pa. The chairman of the program is Dominic A. Donio of Allentown, Pa.; with Herman L. Rudolph of Reading, Pa., acting as co-chairman. The following program will be presented:

1:30 P.M. Tour of the Department of Physical Medicine and Rehabilitation.

2:00 P.M. Welcome by Msgr. Leo G. Fink. "REHABILITATION OF INJURIES OF THE HAND" by Harry Miller, M.D., Allentown, Pa.
Discussion: Harold Lefkoe, M.D., Philadelphia.

2:30 P.M. "RECENT ADVANCES IN ARTHRITIS" by Richard T. Smith, M.D., Philadelphia.
Discussion: Peter J. Warter, M.D., Trenton, N.J., and William Armour, M.D., Philadelphia.

3:00 P.M. "PERIPHERAL VASCULAR DISEASE" by Bruce Marger, M.D., Allentown, Pa.
Discussion: Elmer J. Elias, M.D., Trenton, N.J., and Albert A. Martucci, M.D., Philadelphia, Pa.

3:30 P.M. "HEMIPLEGIA" by J. Murl Johnston, M.D., Pittsburgh.
Discussion: Bertram Bernstein, M.D., Trenton, N.J., and Charles A. Furey, Jr., M.D., Philadelphia.

4:00 P.M. "SHOULDER" by William H. Schmidt, M.D., Philadelphia.
Discussion: B. S. Troedsson, M.D., South Orange, N.J., and Herman L. Rudolph, M.D., Reading, Pa.

4:30 P.M. "POLIOMYELITIS" by George J. Boines, M.D., Wilmington, Del.
Discussion: Robert J. Doman, M.D., Philadelphia, and Clement R. Hanlon, M.D., Bethlehem, Pa.

7:00 P.M. Dinner at Americus Hotel

8:15 P.M. SYMPOSIUM ON "LOW BACK PAIN" Moderator: D. A. Donio, M.D.
Orthopedist: Richard K. White, M.D., Allentown, Pa.
Neuro-surgeon: Howard R. Erb, M.D., Allentown, Pa.
Psychiatrist: Charles W. Umlauf, M.D., Allentown, Pa.
Physiatrist: Joseph F. A. Rubacky, M.D., Passaic, N.J.

Physicians, therapists, nurses and students are cordially invited to attend this meeting. No registration fee will be charged. Dinner reservation is $5.00.

POWER OUTPUT OF DIATHERMY APPARATUS

The following report was published in the July 25, 1953 issue of The Journal of The American Medical Association.

The rating in watts of a diathermy apparatus that is given on its name plate and is customarily used to designate the power output may not be a reliable indication of the ability of the apparatus to heat tissues adequately. The Council on Physical Medicine and Rehabilitation has adopted the so-called thigh test as the standard method of determining heating efficacy. In the opinion of the Council, the temperature rise in the thigh of an average healthy adult is the most accurate way to determine the heating capacity of diathermy apparatus. In brief, acceptable diathermy equipment must raise the temperature of the thigh to 104 F. in 20 minutes without injury to or burning of the skin, or subjecting the patient to intolerable pain.

The rated output of a diathermy apparatus as recorded on the name plate is usually based on results of a test on a phantom lamp, or calorimeter load. The power output revealed by the phantom load might be completely out of line with the actual ability of the apparatus to heat tissues. The reason for this misleading result lies in the so-called matching of impedances. (Impedance for alternating current is similar to resistance for direct current.) This means that the internal impedance (the combination of resistance and reactance that chokes back flow of current) of the diathermy apparatus must match the impedance of the external lamp or calorimeter load. When the two impedances are the same, the greatest output is obtained. When body tissues are heated, their impedance seldom matches the internal impedance of the diathermy apparatus. To compensate for this, the diathermy apparatus must have a reserve of energy so that the physician can be assured that ample heat can be generated in the tissues.

As one of its tests, the Council on Physical Medicine and Rehabilitation uses three lamp loads, each of different value. If satisfactory outputs are obtained on each one of the loads, the Council is reasonably assured that the apparatus will be suitable for heating tissues. When the heating efficiency is questioned, the thigh test must be used to determine the actual conditions. The Council on Physical Medicine and Rehabilitation has made extensive tests of all submitted diathermy apparatus and is convinced that those accepted have ample reserve power to treat patients.

NATIONAL SOCIETY TO MEET

Edward J. McCormick of Toledo, Ohio, President of the American Medical Association, heads a list of distinguished authorities scheduled to speak on the care, treatment and training of crippled children at the annual convention of the National Society for Crippled Children and Adults, Nov. 12-14, 1953, at the Palmer House, Chicago.

Dr. Frances R. Horwich of Chicago, leading child development authority, will be principal speaker at the annual parents institute. Dr. Henry H. Kessler, Medical Director of the Kessler Institute for Rehabilitation, West Orange, N. J., and counselor in rehabilitation to the National Society, will participate in a panel on rehabilitation.

In addition to other outstanding speakers, the program will include general sessions, seminars, exhibits, demonstrations, workshops, social events and other features.

Dr. William T. Sanger, president of the National Society, will preside at this year's convention marking the Society's 30th annual meeting and 32nd year of service to the nation's handicapped.

Architecture and its adaptations to meet the needs of the crippled will be featured for the first time at this year's three-day meeting. A forum on architectural planning for public buildings, schools and hospitals will be included. A special architectural exhibit will contain a model rehabilitation center developed by Salmon and Salmon, architectural consultants of the National Society, and sketches and blueprints from the U. S. Public Health Service, the American Hospital Association and the Easter Seal Societies.

A traditional convention feature, a panel of distinguished persons who have outwitted their handicaps to become productive and successful members of society, is also planned for the meeting.

Recreation will also be considered from the angle of planning recreational programs as part of the total program in hospitals and schools. Special emphasis in the recreation workshop will be given to the needs of the homebound.

Social functions will include an open house, luncheons and the annual President's dinner. Music will be provided by the Valparaiso University Choir of Valparaiso, Ind.

RECENT PUBLICATIONS BY MEMBERS

Arthur S. Abramson, with co-authors, "Value of Exercise in Peripheral Arterial Disease." The Journal of The American Medical Association, September 5, 1953.

Robert L. Bennett, "Role of Physician in Prevention of Musculoskeletal Deformity After Poliomyelitis." The Journal of The American Medical Association, September 12, 1953.

Joseph G. Benton and Howard A. Rusk, "Clinical Progress. The Patient with Cardiovascular Disease and Rehabilitation: The Third Phase of Medical Care." Circulation, September, 1953.

Murray B. Ferderber, "Rehabilitation After a Stroke." The Pennsylvania Medical Journal, September, 1953.

Frederic T. Jung, "The Cost of Medical Latin." The Illinois Medical Journal, September, 1953.

Miland E. Knapp, "Rehabilitation in Severe Poliomyelitis." The Journal of the Iowa State Medical Society, September, 1953.

Christopher J. McLoughlin, with co-authors, "Diagnostic Significance of Blood Sugar Findings." The Journal of The American Medical Association, September 19, 1953.

Eugene Moskowitz, with co-authors, "Follow-Up Study in Seventy-Five Cases of Nonparalytic Poliomyelitis." The Journal of The American Medical Association, August 15, 1953.

Howard A. Rusk, "Medicine's Number One Problem." The New England Journal of Medicine, August 6, 1953.

CHRONIC ILLNESS PLANNING

The Commission on Chronic Illness has issued a 48 page mimeographed publication entitled "Welfare Council Activities in Chronic Illness Planning." The report, a summary of information that the commission obtained several years ago from a questionnaire to 124 community welfare councils, describes the efforts of community welfare councils in 70 cities and towns to make plans for meeting the needs created by chronic illness in their communities and gives a detailed discussion of the various methods used for local studies of prevalence and adequacy of facilities. A limited number of copies are available and may be obtained, free of charge, from the commission offices at 615 N. Wolfe St., Baltimore 5.

DR. KRUSEN NOMINATED

Frank H. Krusen of Rochester, Minn., was named Minnesota's nominee, on June 26, for the President's award in 1953. The award is given annually to a physician who has made a significant contribution to the rehabilitation and employment of persons with physical impairments.

NEW PM&R SECTION

The Ohio State Medical Association has recently approved the addition of a Section of Physical Medicine and Rehabilitation. Walter M. Solomon of Cleveland is Chairman; Herman J. Bearzy of Dayton is the Secretary.

FELLOWSHIPS OFFERED

The Arthritis and Rheumatism Foundation is offering the following research fellowships in the basic sciences related to arthritis:

1. Predoctoral fellowships ranging from $1,500 to $3,000 per year, depending on the family responsibilities of the fellow, tenable for one year with prospect of renewal.

2. Postdoctoral fellowships ranging from $3,000 to $6,000 per annum, depending on family responsibilities, tenable for one year with prospect of renewal.

3. Senior fellowships for experienced investigation will carry an award of $6,000 to $7,500 per annum and are tenable for five years.

Deadline for applications is November 1, 1953 and applications will be reviewed and

awards made by February 15, 1954. Information and application forms may be obtained from: Medical Director, The Arthritis and Rheumatism Foundation, 23 West 45th Street, New York 36, New York.

MULTIPLE SCLEROSIS MANUALS PUBLISHED

Four manuals prepared expressly for multiple sclerosis patients are designed to help in a home program of rehabilitation, physical therapy and recreation.

Written by Dr. Edward E. Gordon, they include "A Home Program for Independently Ambulatory Patients," "A Home Program for Wheel Chair Patients," "A Home Program for Patients Ambulatory with Aids," and "A Home Program for the Care of Bed Patients."

Copies are available from the National Multiple Sclerosis Society, 270 Park Avenue, New York 17. Patients with multiple sclerosis can receive copies without charge at the request of a physician who will specify the appropriate manual needed by the patient.

SIXTH ANNUAL CONFERENCE ON ELECTRONIC INSTRUMENTATION AND NUCLEONICS IN MEDICINE TO BE HELD IN NEW YORK

This year for the first time the Conference on Electronic Instrumentation and Nucleonics in Medicine will be sponsored by the three largest professional societies concerned with the electronic instrument field. The American Institute of Electrical Engineers, the Institute of Radio Engineers and Instrument Society of America have jointly assembled a program of papers for the Sixth Annual Conference covering some of the recent advances in instrument technology intended to facilitate medical and biological research and clinical application.

This meeting, to be held at the New Yorker Hotel, November 19 and 20, 1953, will bring together prominent scientists from the medical, biological and engineering fields to discuss new instrument developments and their application to biological problems.

The conference will include papers on recent advances in instrumentation for X-ray motion pictures, the use of ultrasonic waves in the visualization of soft tissue structures and cancer, analytical methods in blood serum determinations and other papers in medical instrumentation. An evening session will be devoted to a non-technical presentation on cineradiography.

DEATH

We regret to announce the death of Dr. Julius Fuchs of New York City on August 15, 1953. Dr. Fuchs was a Congress member since 1949.

NEWLY REGISTERED THERAPISTS

July 21, 1953

Blaugrund, Lynne, 833 W. State St., Trenton, N.J.

Evans, Richard T., 235 E. Brown St., East Stroudsburg, Pa.

Hecht, Manfred Hermann, 142 Laurel Hill Terr., New York 33, N.Y.

King, Barbara Ann, Child's Apt., Tulip Ave., Floral Park, N.Y.

Litrenta, Elsie Carmela, 56 Tretheway Ave., Wilkes-Barre, Pa.

Preiss, Gerda Liane, Danforth St., Hoosick Falls, N.Y.

Rogerson, Alvin Reid, 170 Gallup Ave., Mt. Clemens, Mich.

Rousseau, Frances Louise, 420 Jessamine St., West Palm Beach, Fla.

Voorhis, Janet Kraissl, 244 Kinderkamack Rd., North Hackensack, N.J.

July 24, 1953

Champion, Marilyn Marie, 28th St., Rt. 1, Ada, Mich.

Hoyt, Suzanne, 1010 N. Jefferson, Iola, Kan.

Lewis, Betty Jean, Onaga, Kan.

Wilson, Ramona Jean, 2033 N. Fifth St., Kansas City, Kan.

August 20, 1953

Perris, Marianne S., 100 W. Albemarle Ave., Lansdowne, Pa.

August 27, 1953

Sofranko, Michael Richard, 30 Dassing Ave., Newark 6, N.J.

September 1, 1953

Bodurtha, Patricia Anne, 41 Elm St., Agawam, Mass.

Cook, Margaret Jane, Amherstdale, W. Va.

Cunningham, Florence C., 558 Culberson St., S.W., Atlanta, Ga.

Cushman, Audrey Fay, 916 E. First St., Maryville, Mo.

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BOOK REVIEWS

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Society of Physical Medicine and Rehabilitation.

MASSAGE AND REMEDIAL EXERCISES IN MEDICAL AND SURGICAL CONDITIONS. By *Noel M. Tidy.* Ninth edition. Cloth. Price, $6.00. Pp. 519 with illustrations. The Williams & Wilkins Co., Mount Royal and Guilford Aves., Baltimore 2, 1952.

This is one of the most valuable working texts for those training physical therapists. It offers sufficient medical background to supply reference study material for the therapist, particularly if supplemented with lectures by physicians and surgeons. Technical details are fairly well elaborated to serve as a background for necessary laboratory practice. Some of the diagnoses and nomenclatures will be slightly unfamiliar to students in the United States, but this should not detract from the book's usefulness. It is suggested that future editions might include more details concerning special problems in ambulation such as those of the paraplegic and amputee, with explanations of total treatment program including occupational therapy and other rehabilitation procedures. Some mention of progressive resistance exercises would seem desirable. This book has a well established popularity as an essential text for the use of physical therapy students.

CORRELATIVE NEUROANATOMY AND FUNCTIONAL NEUROLOGY. By *Joseph J. McDonald,* M.S., Sc.D., M.D., Professor of Surgery, Columbia University, Attending Surgeon, Presbyterian Hospital, New York, Director of the Surgical Service, Francis Delafield Hospital, New York and *Joseph G. Chusid,* A.B., M.D., Attending Neurologist, St. Vincent's Hospital, New York. Sixth edition. Paper. Price, $4.00. Pp. 263, with illustrations. Lange Medical Publications, University Medical Publishers, P. O. Box 1215, Los Altos, Calif., 1952.

The new edition of this text should make it even more popular for the use of the beginner in Neurology. The printing is much more legible and attractive, and the illustrations are greatly improved in quality. The method of presentation in outline form has not been changed, but additional material on muscle testing including new illustrations and more clinical neurological data has been added. There has been considerable revision of most sections with uniform improvement. The book is highly recommended as a study text for students in Physical and Occupational Therapy and should also appeal to medical students. It is lacking only in clinical details of diagnosis and treatment; otherwise, it could compete favorably with the large and expensive textbooks on Neurology.

SECOND ANNUAL REPORT ON STRESS. By **Hans Selye,** M.D., Ph.D., (Prague), D.Sc. (McGill), F.R.S. (Canada), Professor and Director of the Institut de Medecine et de Chirurgie experimentales, Universite de Montreal and *Alexander Horava,* M.D. (Lausanne), Research Associate and Librarian of the Institut de Medecine et de Chirurgie experimentales, Universite de Montreal. Fabrikoid. Price, $10.00. Pp. 526, with illustrations. ACTA, Inc., 5465 Decarie Blvd., Montreal, Canada, 1952.

This book is the second annual supplement of the book titled, "The Physiology and Pathology of Exposure to Stress, a Treatise Based on the Concept of the General-Adaptation-Syndrome and the Diseases of Adaptation," (1950) by the senior author. The first part defines the stress concept, the stressor agents, the tests for stress and resistance and considers the place and importance of the adaptive hormones in the general problem of stress. The second part of the book tabulates and classifies some 4000 articles or books dealing with the general subject, which have appeared since publication of the first annual report, thus making readily available a vast amount of material for those wanting a com-

plete bibliography on any phase of studies of Stress.

The arrangement of the book, text, dull white paper, photographs on glossy paper, and bibliography on yellow paper, increases the ease with which it may be used. Certain sections, notably the one on Inflammation, have excellent explanatory material and include detailed descriptions of recently developed techniques from the authors' personal investigations.

The third part of the volume attempts to integrate the concepts presented in the earlier sections and to emphasize the importance of interrelationships as a means of furthering the understanding of disease entities in man. The book is a valuable reference for those working in any part of the Stress field and provides a most complete bibliography of the publications which have appeared on the subject between 1950-1952.

HOW THIN THE VEIL: A NEWSPAPERMAN'S STORY OF HIS OWN MENTAL CRACK-UP AND RECOVERY. By *Jack Kerkhoff*. Cloth. Price, $3.50. Pp. 311. Greenberg, Publisher, Inc., 201 E. 57th St., New York 22; Ambassador Books, Ltd., Toronto, Canada, 1952.

It is hard to imagine a reader who, having reached the middle of page 2 of this book, would miss a page thereafter and fail to continue to the end. In addition to the interest attached to its many extraordinary characters, there are two points of suspense that are resolved only at the end, and then resolved in so subtle a manner that anyone who thinks he can cheat by reading the last page is neatly thwarted. The author is neither lurid, maudlin, nor callous; his realism and sincerity give the book an almost biblical impact. This work deserves an enthusiastic reception by the general public, including physicians.

FUNDAMENTALS OF NEUROLOGY. By *Ernest Gardner*, M.D., Professor of Anatomy, Wayne University College of Medicine, Detroit. Second edition. Cloth. Price, $4.75. Pp. 359, with 142 illustrations. W. B. Saunders Company, 218 W. Washington Sq., Philadelphia 5; 7 Grape St., Shaftsbury Ave., London, W.C.2, 1952.

In a simple and direct manner the author has presented the fundamental concepts of neuroanatomy and neurophysiology. The evidence of neurological functions involves considerable data, much of which is still inconclusive. In spite of the wealth of available information, the author has written a book which furnishes the groundwork for an understanding of the subject. The book is divided into nineteen chapters according to anatomical units and neurological functions. Although the presentation is brief, chapters on peripheral nervous system, excitation and conduction, properties of the reflex arc, the brain stem, control of visceral activity, cerebellum, and motor and sensory functions of the cerebral cortex, nevertheless include the important principles in neurology. Each chapter terminates with a brief biographical sketch of important contributors, and a well selected bibliography. There are a number of good illustrations and fine diagrams of nervous pathways. The second edition differs from the first by a rearrangement of the text with more appropriate placement of the subject matter and by the addition of new material on the nerve impulse.

In general the book is well written and may be recommended to those engaged in medical studies.

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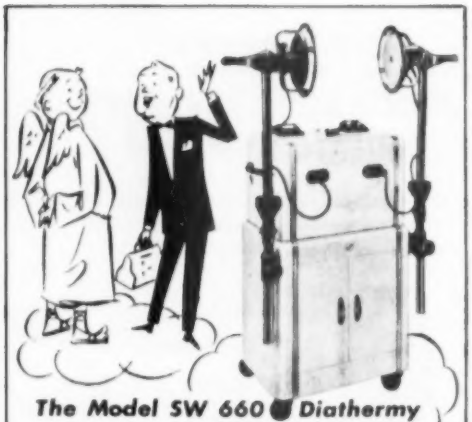

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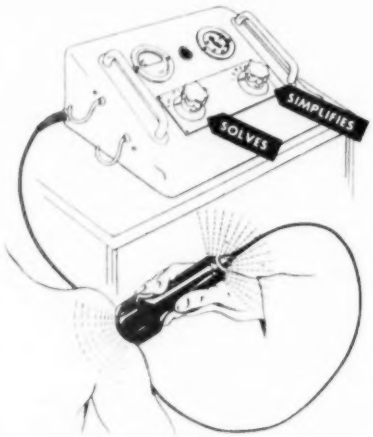

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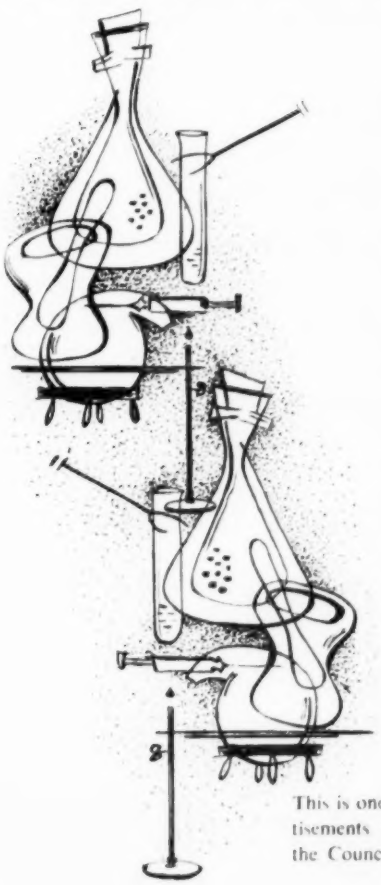

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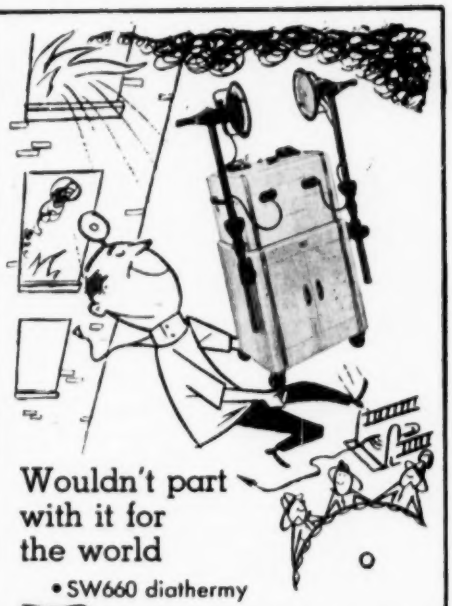

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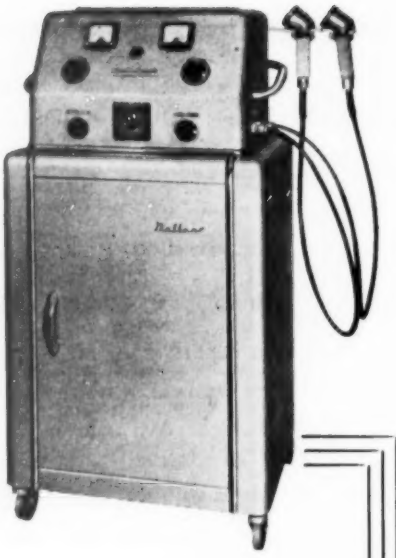

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American Congress of Physical Medicine and Rehabilitation — 32nd Annual Session, Hotel Statler, Washington, D.C., September 6-11, 1954. Walter J. Zeiter, M.D., Chairman, Convention Committee, 30 North Michigan Ave., Chicago 2.

Chicago Society of Physical Medicine and Rehabilitation — Regular monthly meetings, September through May, every fourth Wednesday. Joseph Koczur, M.D., Secretary-Treasurer, 55 E. Washington St., Chicago.

Latin-American Congress of Physical Medicine — Scheduled for February 15-28, 1954. Cassius Lopez de Victoria, M.D., Executive Director, 176 E. 71st St., New York 21, N. Y.

New York Society of Physical Medicine — Monthly meetings held first Wednesday. Madge C. L. McGuinness, M.D., Secretary, 48 E. 62nd St., New York 21, N. Y.

Pennsylvania Academy of Physical Medicine and Rehabilitation — Regular meetings on third Thursday of month, held bi-monthly. Secretary, J. Murl Johnston, M.D., 694 Washington Rd., Mt. Lebanon, Pittsburgh, Pa.

American Occupational Therapy Association —Annual Conference, November 13-20, 1953, Shamrock Hotel, Houston, Texas. Marjorie Fish, OTR, Executive Director, 33 West 42nd Street, New York 18, N. Y.

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1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 1, 1954.

3. Contributions will be accepted from medical students, internes, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 5000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of $200, a gold medal properly engraved, a certificate of award and an invitation to present the contribution at the 32nd Annual Session of the American Congress of Physical Medicine and Rehabilitation at the Hotel Statler, Washington, D. C., September 6-11, 1954.

8. The winner shall be determined by the Annual Awards Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Annual Awards Committee, no contribution is acceptable. The Congress may also award certificates of merit to contributors whose essays may be considered second and third best submitted. Announcement of the winner will be made after the annual meeting. Officers and members of the American Congress and the American Society of Physical Medicine and Rehabilitation are not eligible for this award.

$V = f\lambda$

$f = \frac{V}{\lambda}$

$\lambda = \frac{V}{f}$

V = velocity
f = frequency
λ = wavelength

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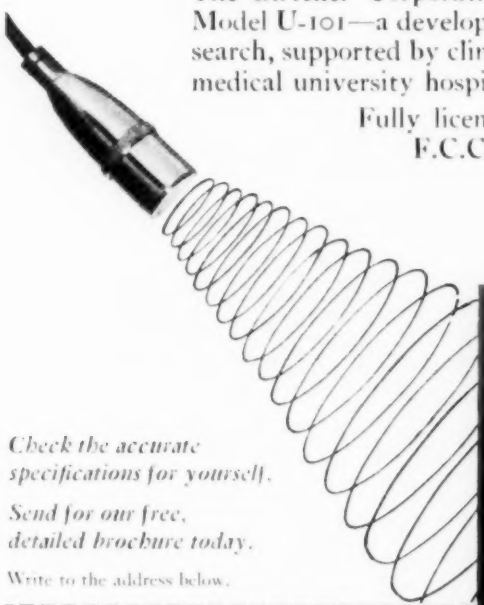

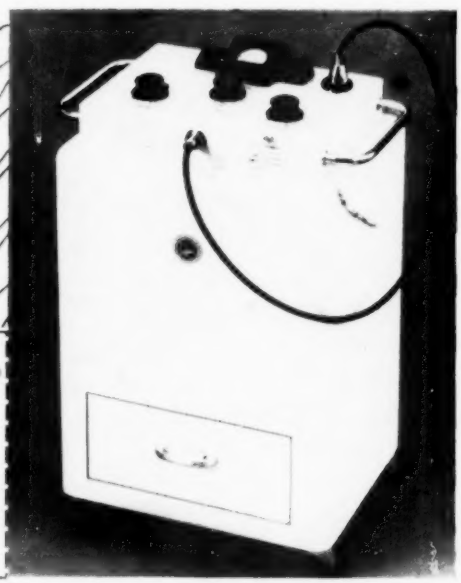

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